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Assessing the ICT Sector Contribution to the Millennium Development Goals

Status quo analysis of sustainability information for the ICT sector

Michael Kuhndt
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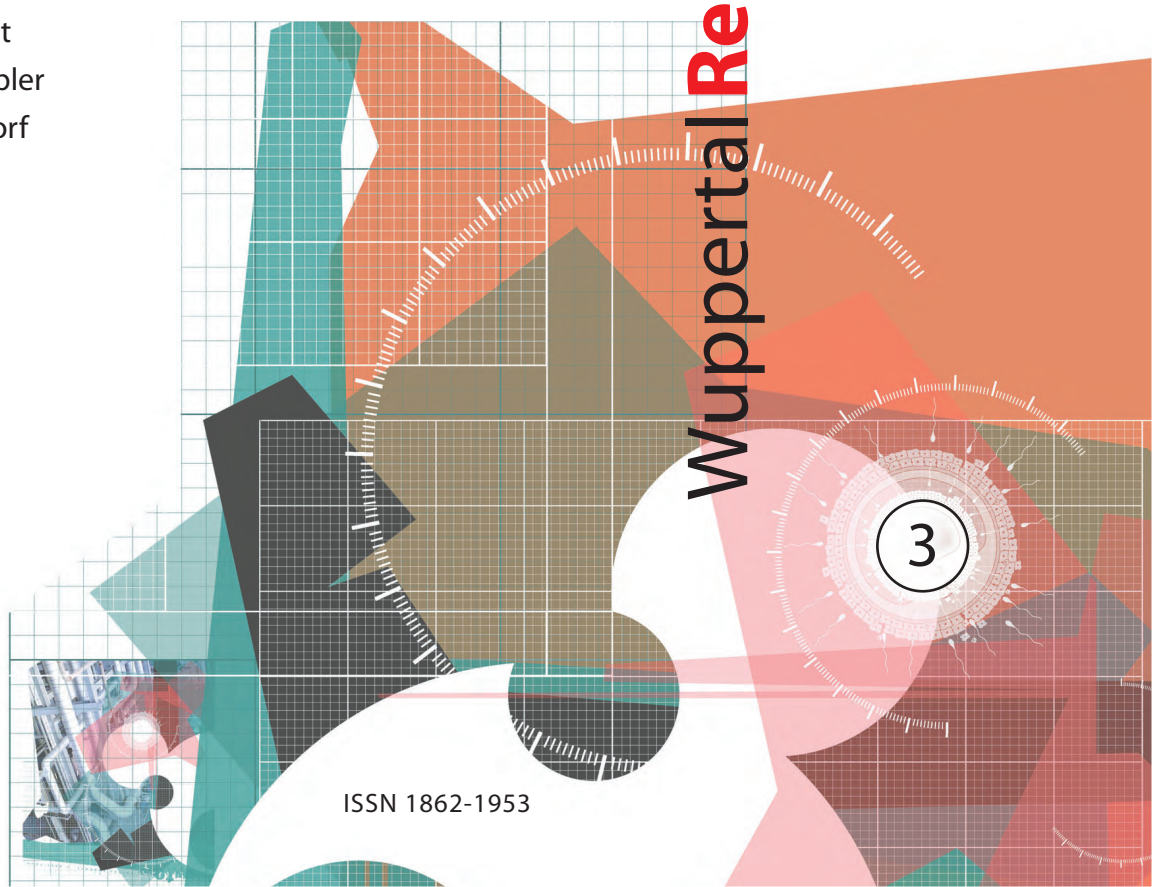

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Wuppertal Report No. 3

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Wuppertal, August 2006

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Final Report

This report presents the results of the project "A Comprehensive Approach for Assessing Risks and Opportunities of the ICT sector and ICT applications". The project has been conducted by the Wuppertal Institute for Climate, Environment and Energy and triple innova on behalf of the United Nations Environmental Programme, Division of Technology, Industry and Economics (UNEP DTIE) with funding from the Global e-Sustainability Initiative (GeSI).

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Acknowledgements

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Executive Summary

This Project Report deals with the assessment of sustainability risks and opportunities for the Information and Communications Technology (ICT) sector and ICT applications. To set a target framework for the analysis, the Millennium Development Goals (MDGs) and accompanying targets were selected. The project outcomes have the purpose to guide the ICT sector in improving relevance and transparency when reporting on its positive and negative impacts, specifically those arising from applications of ICT.

ICT, as a crosscutting technology can in fact contribute to achieve the realisation of the MDGs. This opinion is not only voiced by business, but also expressed in Target 18 of the MDGs as well as from a range of stakeholders, e.g. NGOs, intergovernmental organisations and financial institutions. But ICT implications are not purely beneficial, and a range of stakeholders raises critical topics. Business actors thus need solid and balanced sustainability information to accurately get the implications of ICT and to promote and assess their voluntary activities.

However, quantified information on ICT contribution to the MDGs available today does not meet the expectations of stakeholders. Important sources of quantified information are not systematically linked. Consequently, a lack of relevance persists as sustainability aspects are not covered and prioritised systematically and in accordance with stakeholder expectations, causal chains are neglected and the connection between micro and macro level impacts remains obscure. Furthermore, transparency is not assured, as measurement procedures are deficient or non-existent for important types of information.

A range of approaches is proposed in this report to overcome these challenges. A **common framework of goals and targets** should be applied, which could be subject to regional differentiation. A systematic typology for **indicators spanning the causal chain** is developed to support companies in putting their activities in a societal context in a systematic manner. As an example, a **set of ICT core sustainability indicators** is sketched, allowing for flexible adaptation to different needs and framework conditions. To remedy the lack of transparency, **streamlined measurement procedures** are needed for the various existing quantification approaches.

Next steps forward include establishing a **sector level reporting system** for harmonisation and integration of the existing data. Work is needed to better understand the **implications of regional aspects** for quantification efforts. When aiming at responsible sector governance, quantification and reporting efforts at the **company level** need to be coordinated and linked with information compiled at the sector level. Finally, understanding the business case of quantifying ICT contributions to the MDGs is an important step to further integrate responsible business practices into all organisational sections of the companies involved.

Introduction

> "In cooperation with the private sector, make available the benefits of new technologies — especially information and communications technologies"
>
> Target 18 of the UN Millennium Development Goals[1]

Similar to other technological innovations, the development of ICTs offers a number of opportunities for the achievement of global sustainability.[2] Its nature as a crosscutting technology allows applications in a variety of areas. Awareness of the potential and already realised benefits of ICT applications continues to grow. Direct economic benefits include increased value creation, the provision of employment and government revenues[3]. For industrialised countries, eco-efficiency-enhancing applications in the environmental arena were analysed, most prominently the substitution of transport and buildings, e.g. by tele-working, video-conferencing and e-business[4]. ICT can also play a role in developing countries, contributing to economic development and the successful implementation of poverty alleviation strategies[5]. On the other hand, ICT products and services have been criticised respecting their adverse environmental and social impacts. These include a widening digital divide, working conditions in the manufacturing phase, energy consumption during the use phase and growing e-Waste or health impacts from mobile technologies.

The overall sustainability impact of ICT is presently far from obvious; the provision of sound and balanced information has therefore become a critical task in light of the special focus on the ICT sector in a number of recent global initiatives (see box 1). Partly, these initiatives refer to the Millennium Development Goals (MDGs) as an integrated, widely recognised and accepted framework. This global framework addresses the largest

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1 http://www.un.org/millenniumgoals/

2 Vgl. UNDP (Hrsg.) (2005): UN Millennium Project 2005. Innovation: Applying Knowledge in Development. Task Force on Science, Technology and Innovation, Sterling, USA, S. 59 ff.
WRI (2004): Lessons from the field: An overview of the current uses of information and communication technologies for development, Word Resource Institute, Digital Dividend

3 For a quantitative assessment see mmO2 (2004): The changing impact of mobile phones on the UK economy and its regions. mmO2 plc. Berkshire, United Kingdom

4 See for example: Digital Europe (2004). www.digital-eu.org or Angrick, M. Dompke, M., von Geibler, J., Göhring, W., Herget, M., Hilty, L. Hölzer, C., Isenmann, R., Kuhndt, M., Naumann, S., Pillmann, W., Quack, D. Schneidewind, U., Seifert, E. Memorandum Nachhaltige Informationsgesellschaft: Diskussionsentwurf. AGIANI- Arbeitkreis «Nachhaltige Informationsgesellschaft» des Fachausschusses «Informatik im Umweltschutz» der Gesellschaft für Informatik e.V. (GI), Bonn. 2004. ISBN 3-8167-6446-0.

5 World Bank Group (2004): PRSP Sourcebook, December 16, 2004. Chapter 24: Information and Communication Technologies. WRI (2002): What works: Serving the poor, profitably. A Private Sector Strategy for Global Digital Opportunity, Prepared by C.K. Prahalad, Allen Hammond, Markle Foundation, World Resource Institute

global development challenges and represents the sustainability agenda at the global level. Within the MDGs, target 18 specifically addresses the benefits of ICT and related business contributions (see quote above).

Box 1: Recent global initiatives addressing ICT and sustainable development.

- Global eSustainability Initiative (GeSI) (Founded 2001)
- UNEP/GeSI: WSSD Report for ICT (2002)
- World Summit on Information Society (Geneva 2003 — Tunis 2005)
- GRI Telecom Sector Supplement (2003)
- UN ICT Task Force (2004)
- USAID: Information and Communication Technology for Development (ongoing)
- United Nations Conference on Trade and Development: E-Commerce Branch (ongoing)

The task to provide sustainability information has originally been a governmental task, however policy developments at various levels directly assign responsibilities to the business sector. Examples include the UN Global Compact, the European Commission Green Paper on Corporate Social Responsibility and the World Summit on Sustainable Development (WSSD) Plan of Action, which calls to "actively promote corporate responsibility and accountability" as a measure to address the challenges identified at the summit. Responsible Corporate Governance (RCG) evolved as "a stakeholder-oriented policy approach allocating responsibilities to societal actors, who will drive corporate accountability"[6] and describes a framework for how corporate governance can be shaped with the active involvement of stakeholders. The provision of information plays a key role in analysing stakeholder-driven governance frameworks as the one laid out in the RCG approach (see Appendix 1).

This report presents the results of the project "A Comprehensive Approach for Assessing Risks and Opportunities of the ICT sector and ICT applications". The project has been conducted by the Wuppertal Institute for Climate, Environment and Energy and triple innova on behalf of the United Nations Environmental Programme, Division of Technology, Industry and Economics (UNEP DTIE) with funding from the Global e-Sustainability Initiative (GeSI).[7] The project's core objective has been to develop a discussion paper on the assessment of risks and opportunities of ICT, including aspects of climate protection. The scope of this paper is to raise awareness for a balanced approach of reporting sustainability information (regarding the sustainability dimensions, micro-meso-macro, risks and opportunities) and to provide best practice examples for a comprehensive approach in the ICT sector. A mid-term workshop discussed the first project's results among representatives from the GeSI members.

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6 Kuhndt, M., Tunçer, B., Andersen KA. and Liedtke C. (2004): Responsible Corporate Governance. An Overview of Trends, Initiatives and State-of-the-art Elements. Wuppertal Paper, Wuppertal Institute, Available at http://www.wupperinst.org/globalisierung/html/responsible_cc.html

7 See www.unep.fr and www.gesi.org

Consequently, the paper presents the analysis of stakeholder-driven demand for a solid information base about ICT and sustainable development and a status-quo analysis of available sustainability information in the ICT sector applying the criteria of relevant and transparent information. Furthermore a comprehensive approach for assessing the ICT contribution to the MDGs is developed and suggestions for next steps are made.

Stakeholder information demands on the ICT sector

There is an increasing demand from stakeholders[8] regarding sustainability information in the ICT sector – covering different sustainability dimensions and different levels of aggregation (micro/macro).

Critical-minded stakeholders are concerned about direct impacts along the ICT life cycle as illustrated by the following statements:

- "Women workers in EPZ (Export Processing Zones) are faced with hazardous working conditions, high level of insecurity and intensified work schedules. The absence of trade unions in these zones contradicts one of the ILO core labour standards, the right to free association and collective bargaining." (Gesellschaft für technische Zusammenarbeit)[9]
- "Hazardous substances are widely used in the manufacture of ICT products. These chemicals are potentially serious environmental pollutants, in addition to posing a health risk to workers." (ISIS Asset Management)[10]
- "Trade in E-waste is an export of real harm to the poor communities of Asia." (Silicon Valley Toxic Coalition)[11]
- "Leading companies reduce environmental impacts of their own operations through energy efficiency, installation of state-of-the-art equipment and adequate disposal of redundant infrastructure." (SAM Group)[12]

Other positions are concerned with the potential benefits of ICT applications to reach a variety of societal goals including the MDGs:

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8 We apply a wide understanding of stakeholders, covering employees, unions, business chambers, NGOs, governments, intergovernmental organisations, financial institutions and consumers among others.

9 GTZ: Gender and Trade, In: Gender Sourcebook, online available at http://www.wiram.de/gendersourcebook/cooperation/cooperation_trade.html

10 ISIS Asset Management (2004): The ICT Sector: The management of social and environmental issues in supply and disposal chains.

11 SVTC: Exporting Harm: The High-Tech Trashing of Asia. Silicon Valley Toxics Coalition, Basel Action Network (BAN), Toxics Link (India) and SCOPE (Pakistan), online available at http://www.svtc.org/cleancc/pubs/technotrash.htm

12 SAM Group: BT Group Plc. Fixed-Line Communications, Company Profile

"ICT can support sustainability in many ways. It can create jobs, and the wealth needed to provide a higher quality of life. It can make information more widely available and overcome the isolation of remote regions or disadvantaged social groups." (SustainIT)

"The rapid emergence of a global knowledge economy both shortens the timetable for progress on sustainable development and also offers a potential "win-win" alternative to the traditional trade-off between growth and environmental sustainability". (Dr. Peter Johnston, European Commission, Information Society DG)

"ICT is contributing to technological innovations in the "old economy", and so for example improving the resource efficiency of manufacturing processes and energy transformation processes, leading to reduced resource requirements per unit value added in those old sectors" (Digital Europe, Report to European Union)[13]

"ICTs have brought about a new hope for the developing world (…) the very prospect of 'leapfrogging' the traditional stages and cycles of progress, is seen as revolutionary. Telemedicine, distance education, wireless applications, the use of the Internet for a wide variety of critical information dissemination tasks — hold the promise of overcoming fundamental barriers of infrastructure which have plagued the developing world." (UNDP)[14]

However, a range of stakeholders highlight threats arising from the ICT applications:

"The infusion of ICT into a country paints the existing landscape of poverty, discrimination, and division onto the new canvas of technology use. Because ICT can reward those who know how to use it with increased income and cultural and political advantages, the resulting digital divide shows up in increasingly stark contrast." (www.bridges.org)[15]

"The declaration explores human rights, development and social justice under the new conditions of information and communication technology, and addresses the danger of widening social gaps, inequalities and threats to existing freedoms …" (Civil Society Declaration at the World Summit on the Information Society)

"Implications of a digital divide must be carefully considered in emerging economies, where demand is set to grow significantly." (SAM Group)[16]

"(…) the integration of global networks into everyday life and technological innovation that create more opportunities for personal information to be captured, have both increased the benefits of customisation to the individual user and raised concerns over the protection of privacy and personal data." (OECD)[17]

To focus and organise the variety of topics addressed by stakeholders, the MDGs were

13 Kuhndt, M., von Geibler, J., Türk, V., Moll, S., Schallaböck, K.-O. and Steger, S. (2003): Project theme report: Virtual dematerialisation — ebusiness and factor X, Wuppertal Institute

14 UNDP (2002): Promoting ICT for Human Development in Asia, Realizing the Millennium Development Goals," An initiative of the Asia-Pacific Development Program and Human Development Resource Centre (UNDP), New Delhi.

15 Spanning the Digital Divide: Understanding and Tackling the Issues, www.bridges.org

16 SAM Group: BT Group Plc. Fixed-Line Communications, Company Profile

17 OECD (2003): Privacy online: Policy and practical guidance. Working Party on Information Security and Privacy, DSTI/ICCP/REG(2002)3/FINAL

Table 1: Opportunities and threats of ICT regarding the Millennium Development Goals

MDGs		Opportunities / Threats and Challenges
MDG1: Halving poverty and hunger by 2015		
Opportunities	O1.1	Support the private sector in developing countries
	O1.2	Integrate developing countries into the world economy
	O1.3	Enhance efficiency of governments and support sound poverty alleviation policies
	O1.4	Support good governance and social cohesion
Threats and Challenges	T1.1	Deeper digital divide, within and between countries
MDG2: Achieving universal primary education by 2015		
Opportunities	O2.1	Enhance access to information for teaching
	O2.2	Enhance efficiency of education administration
	O2.3	Bring education to remote regions and socially excluded groups
Threats and Challenges	T2.1	Asymmetrical distribution of benefits/ illiteracy
	T2.3	Side-Effects on educational policy
MDG3: Promoting gender equality in education by 2005, and no later than 2015		
Opportunities	O3.1	Enhance access to education for women
	O3.2	Enhance access to employment for women
	O3.3	Enable women's advocacy and support groups
	O3.4	Foster awareness for women's issues
Threats and Challenges	T3.1	Ensure women are empowered to apply technology
MDG4/5/6: Reducing child mortality, Reducing maternal mortality, Halting HIV/AIDS and other diseases		
Opportunities	O4.1	Enhance access to information for health workers
	O4.2	Enhance access to information for general population
	O4.3	Enhance handling of health information
Threats and Challenges	T4.1	Asymmetrical distribution of benefits
	T4.2	Crowding out of traditional health spending
MDG7: Ensuring environmental sustainability		
Opportunities	O7.1	Improved monitoring and policy enforcement
	O7.2	Increase awareness of sustainable development
	O7.3	Facilitate knowledge exchange and networking
	O7.4	Efficiency-enhancing ICT applications
	O7.5	Structural change of economic systems
Threats and Challenges	T7.2	Indirect environmental impacts
	T7.3	Uncertain indirect and systemic aspects
MDG8: Developing a global partnership for development		
Opportunities	O8.1	Trading and financial system
	O8.2	Official Development Assistance
	O8.3	Market access for "remote" countries
	O8.4	Enable civil-society networks
	O8.5	Provide Distance working opportunities
	O8.6	Integration into the ICT value chain
Threats and Challenges	T8.1	Access in remote areas
	T8.2	Traditionally excluded societal groups
	T8.3	Preconditions for absorption of ICT
	T8.4	ICT investments in poor countries
	T8.5	Virtual vice

Source: Own compilation

applied as a commonly accepted framework for global sustainable development. A literature review of stakeholders' opinions and case studies was conducted to identify the most relevant linkages between ICT and the MDGs. The effects have been organised as Opportunities on the one side and Threats and Challenges on the other (see table 1). A complete overview on the different Opportunities and Threats including explanations and stakeholders' references can be found in Appendix 3.

Taking into account the wide range of potential effects, business actors need solid and balanced sustainability information in order to accurately grasp the scope of the impacts they are generating to credibly promote and collect feedback on their voluntary activities towards sustainable development and to access the outcome of measures they are taking. This task is challenging due to the nature of ICT as a crosscutting technology. Effects depend to a wide extent on the applications realised in complex social contexts. ICT does not only change peoples behaviour; ICT also changes economic and societal patterns. The ICT sector needs to provide balanced and quantified information to different stakeholders on risks and opportunities – on different levels taking into account an integrative perspective linking companies' activities to social outcomes in complex causal relationships.

The supply of Information: Status Quo of quantified sustainability information on ICT

In this chapter, a status-quo analysis of quantified sustainability information from the ICT sector is presented. The criteria for assessing relevance and transparency of information reported by the ICT sector will be defined for the analysis. The subsequent analysis will examine the characteristics of the information reported by the ICT sector and at procedural aspects, specifically the methods that were applied to compile the reported information.

Relevance of Information refers to whether the information provided provides a meaningful picture of the ICT sector's impact. Issues of interest include whether it covers relevant sustainability issues, whether it considers causal connections and interdependencies in coherent way, whether it matches with the responsibilities assigned, and whether it accounts for special regional and sectoral issues. To reach content coherence, issues and priorities must be set. Setting boundaries is a key issue, direct, indirect and systemic effects should be considered. The relationship between companies' actions and social outcomes needs to be considered and the extent to which organisations take responsibility has to be defined in a manner coherent with their actual impacts and action opportunities. The topics dealt with in content coherence relate particularly to the GRI reporting criteria for Sustainability Context and Inclusiveness.

Transparency of Information refers to whether the information meets criteria of accuracy, neutrality, completeness, comparability and auditability, i.e. if the information is collected, processed and disclosed in a sound manner. The procedures should be based on

Table 2: Criteria applied for the status-quo analysis

	Relevance of Information	**Transparency of Information**
	Assessing the right thing?	Disclosing in the right way?
Outcome	• Relevant issues and priorities? • Causal connections? • Assignment of responsibilities? • Regional and sector issues?	• Accuracy • Neutrality • Completeness • Comparability
Procedures	• Stakeholder dialogue • Scientific research	• Follow standards and protocols • Provide methodological information • Replicability and Auditability

Source: Own compilation

common definitions, follow agreed-upon routines, disclose assumptions made and their impacts, explain the given data, give conversion ratios and so on. A variety of standards do exist that should be followed depending on the level of the information assessed. Table 2 presents the criteria applied for the status-quo analysis.

Until now, various efforts have been made to quantify the impacts and benefits of ICT application on a variety of levels. The analysis undertaken covers four different types of quantification efforts on micro and macro level18. On the micro-level, products or services assessments, application case studies or reports by companies or sector associations were analysed. The macro information reviewed covers a range of statistics on the national and international level. For company and sector reports as well as for the macro statistics, indicator lists were compiled. They are categorised according to the Opportunities and Threats/Challenges regarding the ICT contribution towards the MDGs identified above[19].

Sustainability assessments of products and services provide data on sustainability impacts of products and services along their lifecycle. The data can provide a practical basis for comparison and decision-making on different production, product or service options20. When looking at the potential for this category of information to provide the basis for an assessment of the sustainability performance of the ICT sector, various issues arise:

- *Relevance of information:* First, the relevance of information is limited by the domination of environmental impacts; economic and social issues are rarely integrated in these reports. Second, while the methodologies applied are strong on direct and often

18 An overview on the literature considered for the status quo analysis is available in Appendix 2, classifying the information according to the four types of information analysed.

19 Indicator compilation was done for MDGs 1, 7 and 8 only, as these three were identified as the most relevant by the interims workshop. The indicator list is given in appendix 3.

20 e.g. as done for products under the BASF Eco-Efficiency analysis, see http://www.basf.com/corporate/ehs_eco-efficiency.html

cover indirect effects, systemic issues are seldom addressed . Sector-specific issues are dealt with in depth as the analysis starts from concrete products and services of the sector, while regional issues are often not considered. The setting of priorities (on direct, sector-specific environmental impacts) is determined partly by the methodology itself, sometimes by companies' or departments priorities but seldom by stakeholder engagement[21].

- *Transparency of information:* Standardisation of procedures is quite sophisticated for assessment methodologies[22]. If these standards are followed, resulting data is likely to be accurate and complete. However, the need to set specific assumptions makes comparisons difficult and hinders the replicability of results. External verification can improve the trust in the neutrality of the study and is applied in a few cases.

Application case studies are available for an abundance of possible ICT applications in different regional settings[23]. Most of the studies remain anecdotal, while some feature basic quantified information, e.g. on number of persons affected, investments required and potential economic and social benefits. This quantified information is valuable for assessing the viability and implications of ICT applications in concrete projects. Issues concerning application case studies include:

- *Relevance of information:* Taking the viewpoint of ICT sector's impact, the relevance of information however is limited as aggregating the reported information or transferring findings to different regional settings is often not feasible if baseline conditions are not comparable. The scope of information is normally limited to intended sustainability effects. It thus covers neither direct impacts of the technology applied nor indirect or systemic side effects on other sustainability aspects. Stakeholders apart from the directly and intentionally affected actors are often not taken into consideration, reducing the procedural soundness of the studies. Although priorities vary across the case studies positive aspects are the uptake of a wide range of sustainability issues and an exceptional coverage of sector and regional issues as these are of apparent importance in a specific case study context.
- *Transparency of information:* Omission of standard procedures to compile the information reduces transparency. Case studies are sometimes not neutral, providing information in an imbalanced way especially when they are setting out to promote certain measures. Although quantitative data may be accurate, it is mostly not replicable, further reducing transparency.

To give a balanced view of the implications of the ICT sector and ICT applications, case

21 Regarding biotechnological, setting priorities for product and production assessment with stakeholder engagement was done under the BioBeN Project. See www.bioproduction.de

22 e.g. see ISO norms 14040 to 14043

23 WRI (2004): Lessons from the field: An overview of the current uses of information and communication technologies for development, Word Resource Institute, Digital Dividend; more case studies relating ICT to the Millennium Development Goals are online available at http://www.developmentgateway.com.au/jahia/Jahia/cache/offonce/lang/en/pid/1202

studies can be used as first step. Then information should be streamlined, aggregated and weighted against other sustainability information.

Company and sector reports are mainly available in form of corporate sustainability or CSR reports, where both the number and quality of reports are constantly improving. Early sector reports have been published by, for example ENTO.[24]

- *Relevance of Information:* Companies extended scope and boundaries over time, with direct aspects getting supplemented by indirect ones and reporting efforts covering increasing parts of the value chain. This has led to an improved relevance of information. Regarding systemic effects, however, most reports struggle with displaying a balanced approach that quantifies ICT impacts and benefits in production and consumption integrating different sustainability dimensions and going beyond a case study level. Reports by single companies cannot evaluate issues where the combined impact of companies is relevant. While individual companies can report on their efforts towards resolving these problems, the effectiveness of measures undertaken can only be evaluated from a wider point of view. Looking at procedures to secure the relevance of information, companies in the ICT sector do undertake stakeholder dialogues to identify information demands, both when preparing a report and when collecting feedback. A number of companies apply the 2002 GRI Guidelines, committing themselves to a standardised set of indicators legitimised by a broad stakeholder basis. In the telecommunications sector, some companies have even started to work on the implementation of the GRI telecommunication supplement.
- *Transparency of Information:* Transparency of information is relative easily secured for direct, in-house impacts. Indirect and systemic aspects are more based on case studies, where the same limitations noted above apply. Reported data can to some extent be compared where the GRI reporting principles are followed. On a procedural level, the question of technical protocols for the GRI Guidelines is prominent. At present technical protocols are only available for some selected indicators while protocols for the whole set of indicators are still under development. Until the GRI Boundary Protocol is finalised and applied, uncertainty in setting boundaries will persist. Technical Protocols for GRI sector supplements are completely missing although standardised accounting methods for greenhouse gases has been well developed, for instance under the GHG Protocol initiative. Despite the lack of standards, external evaluation is developing, either through external verification procedures or through systematic screening by stakeholders, e.g. by the SRI community (see box above)[25].

24 e.g. ENTO (2002): Sustainable Together. The 2002 ETNO environmental report. The European Telecommunications Network Operators‘ Association, online available at http://www.etno.be/upload/down_files/7451/Environmental%20Report%202002.PDF

25 This is done by rating agencies, e.g. by SAM for the DJSI.

At the macro-level, national and global statistics are widely available with respect to a variety of topics. Most prominently covered is connectivity, specifically the availability of physical connections to ICT networks. Other areas analysed are the pervasiveness of e-Government efforts[26], the preparedness of citizens to apply ICT and general national indicators on economic, social and ecological issues27. These provide a basic but valuable input to quantify the impacts of ICT, but more comprehensive information is needed.

- Relevance of Information: A few national and international initiatives have directly addressed the assessment of sustainability effects of the ICT sector and its applications. Traditional economic benefits of ICT are well documented, e.g. in the areas of employment and economic growth[28]. First efforts for a more complete account of ICT's effects have been undertaken; these include the indicators developed by a WSIS Thematic Meeting[29] and the outcomes of the UN ICT Task Force[30]. While the WSIS indicators provide a picture of access and usage, they cover neither individual company activities nor the relationship of ICT infrastructure to social outcomes. The UN ICT Task Force does not provide a definite set of indicators, and existing indicators fall short of providing a complete picture. A challenge in collecting relevant information thus remains the integration of different sustainability dimensions and linking ICT-related activities to social outcomes. The degree of interaction with stakeholders in defining assessment priorities depends strongly on the national statistical institutions. However, civil-society interaction as prescribed in the World Bank's Poverty Reduction Strategy Papers is likely to drive stakeholder interaction in defining national statistical indicator sets forward.
- *Transparency of information:* The information provided suffers from a lack of a common ICT definition. It is unclear which industry and service sectors are to be included, e.g. value added services. No clear methodology exists to assess usage patterns; cross-country comparable data thus is only sparsely available. Where efficient national statistical institutions exist, building up the capacity to measure ICT impacts is far easier than the situation of a general lack of statistical capacities as is prevalent in developing countries where ICT can have strong impacts in, for instance, the area of poverty alleviation.

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26 UNPAN (2003): World Public Sector Report 2003: E-government at the Crossroads, http://www.unpan.org/dpepa_worldpareport.asp

27 as given in UNDP (2004): Human Development Report 2004 – Cultural Liberty in Today's Diverse World, http://hdr.undp.org/reports/global/2004/

28 mmO2 (2004): The changing impact of mobile phones on the UK economy and its regions. mmO2 plc. Berkshire, United Kingdom

29 WSIS (2005): WSIS Thematic Meeting on "Measuring the Information Society", Final Conclusions, World Summit on the information Society, Geneva 2003 - Tunis 2005,

30 UN ICT Task Force (2003). Tools for Development. Using Information and Communications Development to Achieve the Millennium Development Goals. Working Paper. http://www.unictaskforce.org/perl/documents.pl?id=1219

Table 4: Summarising the findings. A '+' marks positive and a '–' negative aspects.

		Micro/ Meso			Meso/Macro
		Product and service assessment	**Application Case Studies**	**Company and sector reports**	**General and ICT statistics**
Relevance of Information	**Outcome**	– Environmental aspects dominate – Indirect and systemic aspects not in focus + Sector issues covered – Regional issues normally out of focus	– Coverage of aspects limited – Tendency to focus on intended effects – Infrastructure and side effects neglected + Good in indirect effects + Sector and regional issues covered in depth	+ Good coverage of direct impacts + Evolving on indirect effects – Missing systemic effects + Balance of environmental and social issues – Economic and financial issues often not integrated + Sector issues introduced through GRI sector supplement	+ Economic benefits covered + Access indicators well established – Lack of quantified information on social and environmental effects – Time gaps in data collection – Limited cross-sectoral impact data
	Procedures	– Assessment focus often exogenously given – Limited stakeholder involvement for determining assessment focus	+ Involvement of intentionally effected actors – Limited stakeholder involvement for determining assessment focus	+ Stakeholder involvement evolving as standard procedure + Application of GRI guidelines and sector supplements promotes concurrence on reporting major sustainability aspects	+ Interaction with stakeholders at national level institutional levels + Increasing civil society participation – Cross-country comparability is poor
Transparency of Information	**Outcome**	– Comparability limited due to product/service specifics + Auditable information if assumptions are laid out	+ Illustrative information – Comparability limited due to product/service specifics – Neutrality not secured – Information often not auditable	+ High transparency regarding direct aspects – Information on indirect aspects often case study based, not comparable and auditable	+ High levels of transparency due to harmonised assessment approaches – Time gaps in data collection
	Procedures	+ Standards exist and are followed – Assumptions differ and are not always made explicit + External verification progressing	– General lack of standards	+ GRI principles and indicators are widely applied – Lack of technical protocols + External verification and screening wide progressed	+ Established measuring methodologies on access indicators – Insufficient definition on ICT sector
Source: Own compilation					

Table 4 summarises the advantages and drawbacks of examining the ICT sector's sustainability impacts by means of the four approaches analysed above. Despite providing useful information in their specific domain, they do not entirely fulfil the criteria of relevance and transparency developed above. Thus, stakeholders are not receiving balanced information regarding the ICT sector sustainability impacts.

Transparency and relevance can be improved by integrating perspectives. This approach needs to build on the existing individual approaches, while putting them in a common framework to allow for a comprehensive review of the ICT sector's impacts. A framework fulfilling the criteria will be laid out in the following chapter.

Improving relevance and transparency of quantified information

This chapter describes concrete approaches on how to address the challenges identified above in order to improve relevance and transparency of quantified sustainability information on ICT.

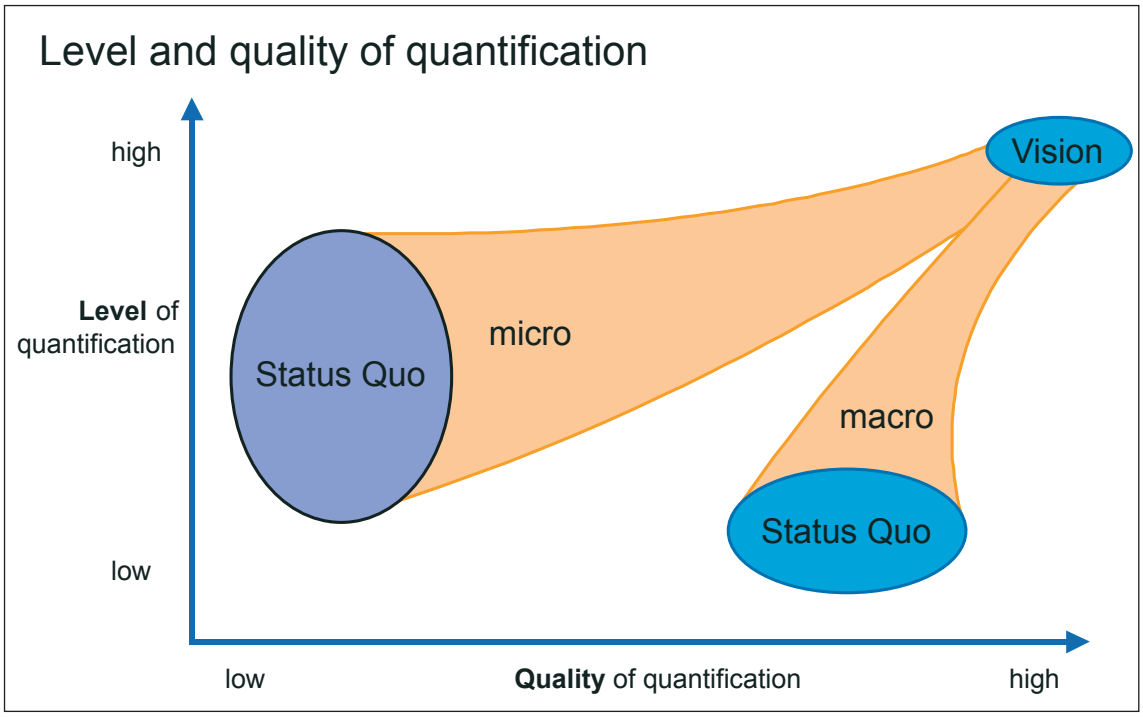

Figure 1: Status quo and vision regarding level and quality of quantification on the micro and macro level[31]

Both the level and the quality of quantification can be improved at both micro and macro level. In the status quo, a high level of quantification exists on the micro level, while the quality of the information provided with respect to relevance and transparency is quite low. In contrast, while the quantity of information available on the macro level is com-

31 This is a variation on the original figure presented and discussed in the interim workshop.

paratively limited, the quality is higher due to standardised methods applied by national statistical offices.

The vision is to lift both the level and the quality of quantification on a higher level. While trying to reach this goal, several challenges are to be encountered. Table 5 below provides an overview of suggested approaches to address those challenges, which are described in greater detail below.

A varying focus on different sustainability aspects is encountered across the different types of reported information. The usage of a common scope could be beneficial to allow comparisons and aggregation of data provided.

Table 5: Challenges and solutions for improving quantified ICT sustainability information

	Challenges		Suggested approaches
Relevance of Information	Use a common scope	➜	Common framework of goals and targets
	Gain a firm understanding of causal chains	➜	Indicators spanning the causal chain
	Agree on central issues	➜	Set of ICT core sustainability indicators
	Measure the magnitude of cause-and-effect	➜	Semi-quantitative case study aggregation
Transparency of Information	Assure accuracy, neutrality, completeness, comparability	➜	Streamlined measurement procedures

Source: Own compilation

Specifying a common framework of goals and targets

A commonly accepted framework of goals and targets defining priorities and offering criteria for categorisation thus is a first step towards a more systematic measurement framework, producing valuable information for stakeholders. The framework can be set by stakeholder engagement, by utilising expert knowledge or by taking an external agenda.

For the purpose of this project, the Millennium Declaration and the accompanying MDGs have been selected as a basis for analysis. They present a global commitment to tackle the most pressing social, environmental and economic issues facing the world. They have received unique worldwide support and recognition by stakeholders, and therefore provide a solid basis for the purpose of this project. All targets are relevant for the private sector in our global society. Whilst the main responsibility is designated to governments to create an environment for development, it is within this environment that the private sector can make a contribution. Thus it can be used for linking macro and micro level information.

Indicators spanning the causal chain

The existing singular approaches fail to account for causal chains linking companies' activities to societal outcomes. The Opportunities for contributing towards the MDGs depend on various factors: Do people have access to technology? Are they prepared to use the technology? What are the real usage patterns? And does the application in a concrete context actually contribute towards the goal in focus? All these factors determine to some extent the degree to which the envisioned societal benefits of ICT materialise. The ICT sector should aim to provide information on all steps in the causal chain to demonstrate the existence of benefits from ICT and identify the most critical obstacles towards an extension of the opportunities that have been realised to date.

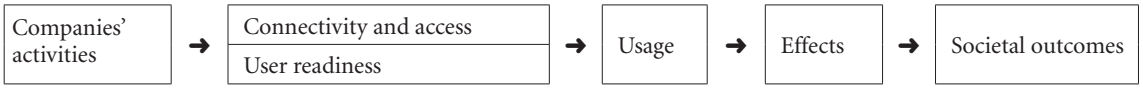

Figure 2: Causal chain for ICT contributions to societal goals

A measurement framework should thus consider these causal connections to assure relevance of the information provided. In most cases there is no single indicator providing an appropriate impression of the causal chain. Indicators can relate to different points in this causal chain, and a complete assessment would need to apply the indicators in parallel to identify the existence of a causal chain or interrupting factors.

- *Indicators of activity* allow information recipients to obtain an overview regarding the activities undertaken by a certain actor. For example, a company might provide preferential rates for schools promoting wider Internet access for schools.
- *Indicators of access* relate to the connectivity and, based upon that, access to ICT in a certain condition relevant to the respective opportunities in focus. This can be given as a number of teachers or students having Internet access in educational institutions or hospitals with central databases on health issues. Some indicators of provision coincide with traditional connectivity and access indicators, although the specific context at hand specifies the concrete information needed, taking institutional forms of access into consideration.[32]
- *Indicators of user readiness* illustrate the preparedness of the actors in question. Their qualifications need to match the necessities in applying the technology in a value-creating manner. Literacy is a basic condition, and content must be available in languages spoken by the users. General education, "digital literacy" and a basic knowledge of the subjects at hand are further preconditions for an effective use of ICT products and

32 The most often used denominators are „per thousand people". Regarding the context, this should be changed to the proportion of households, businesses or individuals having access to ICT, therefore considering the concrete conditions of usage.

services. The concept of user readiness can be extended towards the supply side of content as in the case of government information portals, where substantial human and organisational capital is needed to create valuable information sources.

- *Indicators of use* measure the actual acceptance of the products and services envisioned, as benefits do not accrue from access and user readiness alone. Examples include hours spent online by the actors in focus, transactions successfully undertaken over web interfaces or files accessed in a central database.
- *Indicators of cause and effect* provide information on how ICT use translates into impacts, e.g. "waiting hours reduced due to introducing ICT". Normally, these effects cannot be accessed directly, but can be identified by studies applying statistical analysis.
- *Indicators of societal outcome* like the social and environmental indicators given for the MDGs[33] provide information on the final results, but do not allow insight on the specific contribution of ICT usage as the transmission mechanisms are not taken into account. The concrete ICT related contribution is not identifiable; as there can be neutralised, reinforced or inversed by wider societal development.

Sketching a set of core sustainability indicators for the ICT sector

A set of core sustainability indicators for the ICT sector is given in table 6. The need for a set of core indicators has been identified through the discussions at the interim workshop of the project. The indicator set was drafted in accordance with the above considerations in mind regarding the framework for goals and targets as well as the indicators spanning the causal chain. It was also designed in a flexible way to allow easy adaptation to specific situations. Reporting based on this set shall allow the information recipients to reach a quick overview over some of the highlight topics and the state of the measurable information.

The MDGs were kept as a framework for goals and targets, with the indicators focusing on goals 1, 7 and 8. These goals were identified as especially relevant for the ICT sector during the workshop discussions. The set of core indicators was developed based on a screening of the existing indicators identified in the literature review (for the full list, see Appendix 4). Special focus was put on previously agreed indicator sets legitimised by stakeholders and with above average data availability. The indicator set covers the entire chain from companies' activities over access, user readiness, use, cause and effect and societal outcomes.

33 The MDG indicators and other generic outcome indicators are available in UNDP (2004): Human Development Report 2004 — Cultural Liberty in Today's Diverse World, http://hdr.undp.org/reports/global/2004/

Table 6: Core indicators: Contributions by the ICT sector towards realising the MDG

	Indicator	Data sources	MDG	References	Relevanz / Annotations
Indicators of activities					
1.	Investments in ICT infrastructure as a percentage of GDP (split after public/private and internal/external investments)	ITU Word Telecommunication	1,8	OECD 2005 World Bank Group 2004	
2.	Tariffs for accessing ICT Service / buying ICT Product in US$ and as a percentage of per capita income	Indicators database	1,8	WSIS 2005	
3.	Preferential pricing Proportion of ICT Service / ICT Product priced below market rate for social reasons (optional: for specific user group)		1,8		Optional focus on specific user group according to analytical interest, i.e. MDG or Opportunity / Threat in focus
4.	Proportion of total workforce involved in the ICT sector	OECD Key ICT Indicators	1,8	WSIS 2005	
5.	Value added in the ICT sector (as a percentage of total value added) on national basis	OECD Key ICT Indicators	1,8	WSIS 2005	
Indicators of access					
6.	Proportion of units in User Group having access to specific ICT Product or ICT Service	ITU World Telecommunication Indicators database	1,8	WSIS 2005, ITU 2003, European Commission 2003, UN-ICT, ITU 2003	Select unit of analysis according to analytical interest, i.e. MDG or Opportunity / Threat in focus
7.	Digital divide index (e.g. DIDIX)	Hüsing and Selhofer 2004	1,8	Hüsing and Selhofer 2004	
8.	Proportion of people in User Group with access to ICT Service or ownership of ICT Product in relationship to proportion of total population having access or ownership		2		
Indicators of user readiness					
9.	Literacy rate (optional: in specific User Group)				
10.	Stated / proven ability to use specific ICT Product / ICT Service (optional: in specific User Group)				
Indicators of use					
11.	Proportion of units in User Group having used a specific ICT Product or ICT Service within a certain time frame (optional: to undertake a specific Activity)		1,8	WSIS 2005	Business were selected as unit of analysis to better grasp the impact of ICT diffusion into SME
Indicators of cause and effect					
12.	(Positive or negative) Change in target indicator attributable to ICT use (consider direct / indirect / systemic aspects, optional: use of specific ICT Product or ICT Service / in specific User Group / when fulfilling a certain Activity)				E.g.: CO_2 emission (target variable) of ICT sector along life-cycle (direct and indirect)
Indicators of generic outcome					
13.	MDG Indicators	UNDP		UNDP 2004	
Source: Own compilation					

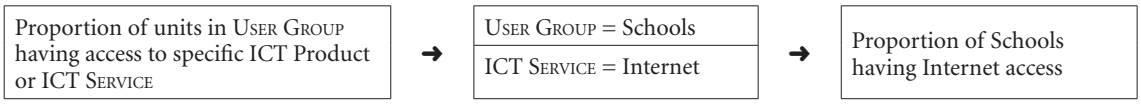

Figure 3: Deriving concrete indicators from the core indicator set

The indicators are not absolute, thus they allow for flexible adaptation according to regional or company priorities as well as for data availability. They contain the four variables of (1) ICT Product, (2) ICT Service, (3) User Group and (4) Activity with each variable being able to take up a range of values (see table 7). To reach concrete indicators, the placeholders have to be substituted with the values given for each variable as depicted in figure 3.

Table 7: Variables used in the core indicator set

ICT Product	ICT Service	User Group	Activity
• Mobile telephones • Fixed line telephones • Computer • Television • …	• Mobile telephony • Fixed line telephony • Internet • Broadband internet • Wireless internet • …	• All inhabitants • Businesses • NGOs • Government offices • Students • Teachers • Doctors • People living in rural areas • People living below poverty line • Disabled people • Members of ethnic minority • …	Depends on User Group and ICT Product / ICT Service E.g. for businesses and Internet: • Receiving order over Internet • Finding employee over Internet • Having interaction with governmental office over Internet • Providing On-line information to customers • …

(Source: adopted from Kuhndt et al. 2002.[34])

Semi-quantitative case study aggregation

Of the indicators outlined above, *Indicators of Cause and Effect* depicting the concrete contribution of ICT provision and usage to environmental, social or economic outcomes are less developed than the other types of indicators. This holds special relevance if indirect and system effects are to be taken into consideration, including impacts in other sectors. Semi-quantitative case study aggregation[35] can be a remedy to this challenge. This section will outline how to select and aggregate case study information (with a specific focus on resource efficiency).

34 Kuhndt, M., Geibler, J. v. and Liedtke, D., (2002). Towards a Sustainable Aluminium Industry: Stakeholder Expectations and Core Indicators. Final Report for the GDA (Gesamtverband der Aluminiumindustrie) and the European Aluminium Industry. Wuppertal Institute, 122 p.

35 This approach was discussed in the project's workshop.

Table 8: Direct and cumulated CO_2-emissions and primary energy use by the ICT sector – Germany 1991–1999 (Source: Kuhndt et al. 2003.[36])

	absolute (1000 t)		change (%)	% share on total*	
	1991	**1999**	**'91-'99**	**1991**	**1999**
direct CO_2-emissions	4.587	3.705	-19,2%	0,61%	0,57%
cumulated** CO_2-emissions	26.762	28.985	8,3%	1,72%	2,23%
	absolute (PJ)		change (%)	% share on total	
	1991	**1999**	**'91-'99**	**1991**	**1999**
direct energy use	103	104	1,1%	0,96%	1,04%
cumulated** energy use	415	501	20,8%	1,84%	2,35%

* total refers to production sectors, not including private households

** indirect CO_2-emissions and energy-use induced by domestic and foreign intermediate consumption

Source: Federal Statistical Office Germany 2001

The suggested approach is a combined top-down / bottom-up approach and considers first, second and third order effects. It can be summarised in four steps:

1. Setting priorities (sustainability aspect, sector/human need)
2. Collecting evidence on ICT contribution
3. Assessing ICT contribution
4. Communicating the outcomes

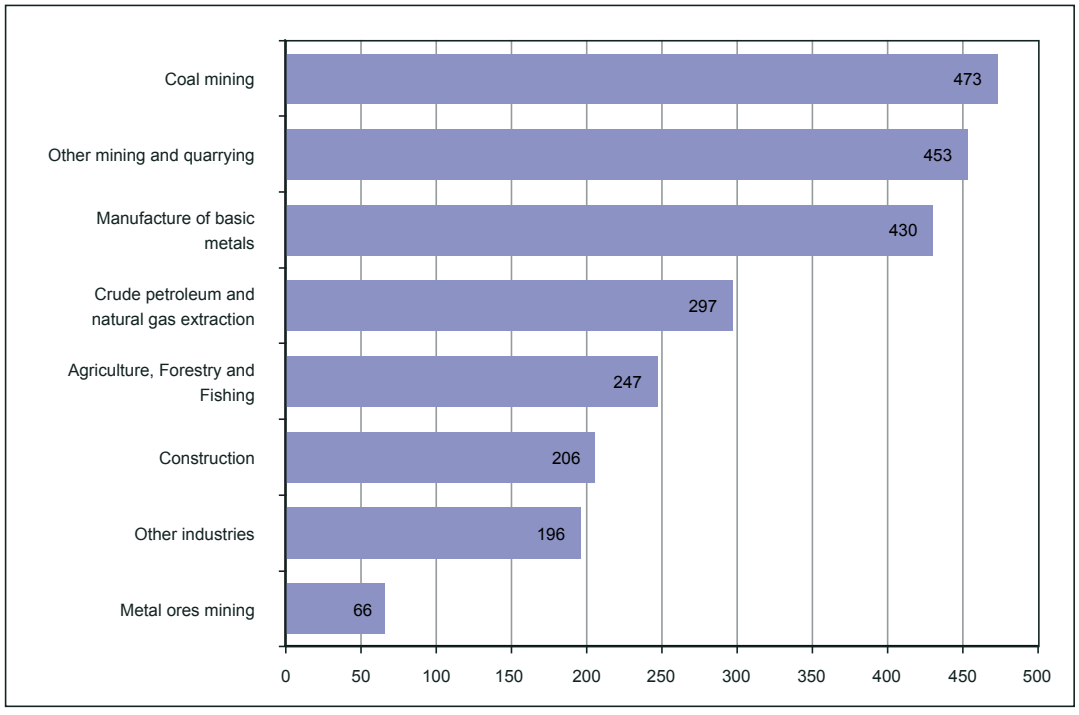

Figure 4: Contribution of different sectors to Total Material Requirements in UK, 1999. (Source: Wuppertal Institute)

36 Kuhndt, M., von Geibler, J., Türk, V., Moll, S., Schallaböck, KO. and Steger, S. (2003): Project theme report: Virtual dematerialisation – ebusiness and factor X, Wuppertal Institute

Step 1: Setting priorities (sustainability aspect, sector/human need)

A vast number of case studies are available on various ICT products and services as applied in different sectors or areas of human need with impacts on different sustainability aspects. The following selection criteria should be applied before screening for case studies:

- *The sustainability aspect* in focus should be of considerable importance and should allow aggregation on the macro-economic level. For this purpose a consistent set of accounting methods should exist for the micro, meso and macro level. This is certainly the case for employment, GHG emissions and material use and for the topics highlighted by the MDGs (depending on the country setting). For an example of aggregated CO_2 emissions and primary energy use, see table 8.
- *The sector or area of human need* should have significant impacts. For this, economic importance can be used as a proxy variable, but direct information on sustainability impacts is preferable. This information is available for example for material use as shown in figure 4 and 5.

In the case of resource efficiency, the "old" sectors (such as energy, agriculture, metal manufacturing) and strongly related areas of human needs (housing or nutrition) have turned out to be the most relevant in terms of their resource consumption. Consequently, the contributions of the ICT applications to the resource efficiency in those sectors might be promising areas of application for ICT. The next step will look at the specific ICT contribution within those other sectors.

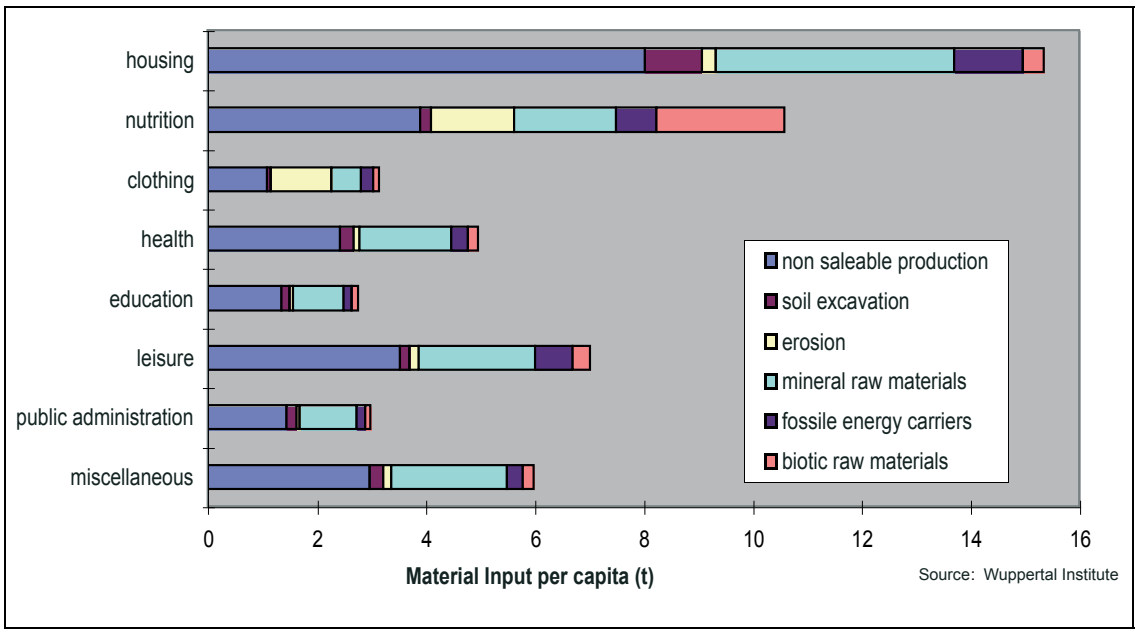

Figure 5: Contribution of human need areas to the Material Inputs per capita in Germany. (Source: Behrensmeier and Bringezu, 1995[37])

37 Behrensmeier, R. and Bringezu S. (1995). Der bundesdeutsche Umweltverbrauch nach Bedarfsfeldern: Zur Methodik der volkswirtschaftlichen Material-Intensitätsanalyse. Wuppertal Paper 46. Wuppertal Institute.

Step 2: Collecting evidence on ICT contribution

Based on existing case studies (see section on status-quo) or specifically initiated case studies evidence for the ICT contribution can be collected. Screening should start on ICT applications with an actual or potential widespread use to address important sustainability aspects in high impact sectors. Complex and costly products or services in niche markets should be avoided. From an analysis of the case studies, concrete ICT contribution that has been realised, prerequisites and key influential factors can be extracted.

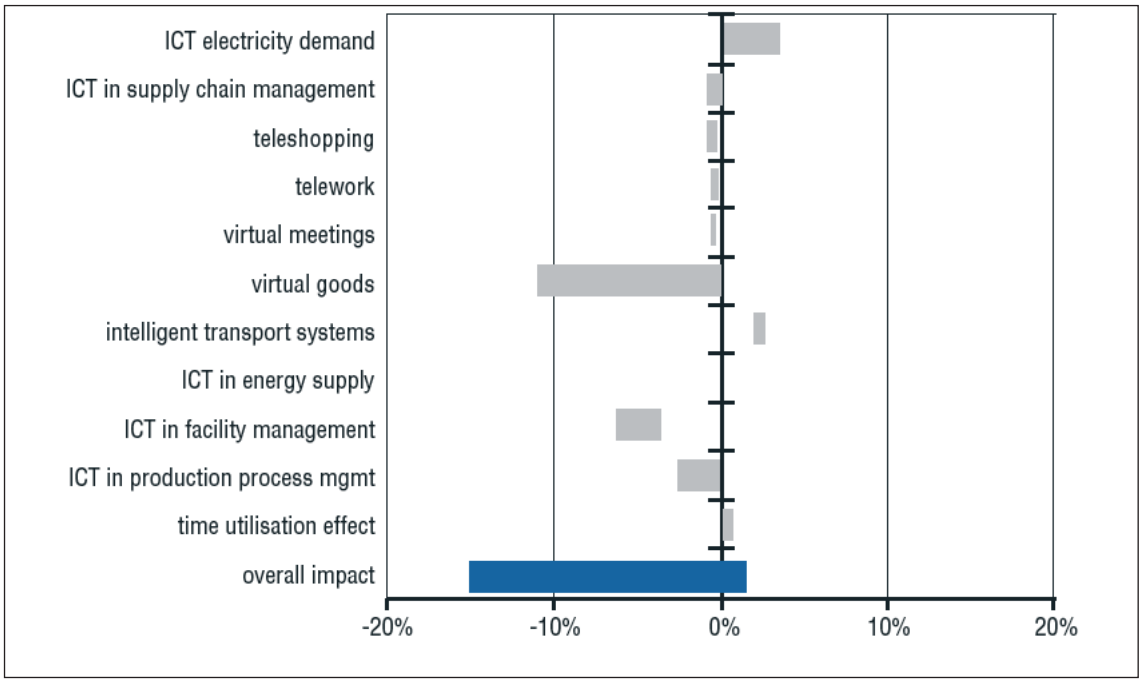

Figure 6: The future impact of ICT on total cumulative greenhouse gas emissions 2020 (broken down in 11 components. The bars cover the full range of uncertainty of the results, including the difference between the future scenarios as well as the uncertainty of data that have not been varied among these scenarios (but for best-case and worst-case optimisation). Note that there is no simple and reliable method to derive overall impact (represented by the black bar at the bottom) from the grey bars, because there can be significant interactions between the ICT effects.[38]).

Step 3: Assessing ICT contribution

In this step, the actual and potential effect of ICT on certain sustainability aspects at the macro level is analysed. This can be accomplished by combining the relevant information for the cause-and-effect chains from the case study analysis with input from expert opinion[39]. Expert opinions should be compiled regarding the influence of ICT within specific sector/human need areas with regard to effects at the national level. The following figure could be a potential result of such a consultation with experts respecting ICT impacts (the values are intended merely to indicate the direction and an approximation of the magni-

38 Erdmann, L., Hilty, L. Godman, J. Arnfalk, P. (2004). The future impacts of ICT on environmental sustainability.

39 see: Erdmann, L., Hilty, L. Godman, J. Arnfalk, P. (2004). The future impacts of ICT on environmental sustainability.

tude of the impacts). Two variables result when the data from concrete impacts derived from the case studies is combined with available macro-economic statistics on actual and potential usage patterns:

- *Actual Contribution:* How does the (sector specific) application in focus affect the sustainability aspects considered as important? (based on actual usage patterns)

Potential Improvement: How big is the potential improvement when reaching full market penetration of the specific application? (based on the difference between potential and actual use patterns)

The resulting values could be generated as quantified information (see for example figure 6).

Step 4: Communicating the outcomes

The resulting approximation of the ICT contribution to the impact areas can be visualised in a two-dimensional matrix as used for sketching the cause-and-effect chains. Since quantified numerical information on the ICT contribution might unduly suggest a precision in the methodology and soundness of the result, results might also be rated on a discrete scale (e.g. high positive contribution, medium positive contribution, low/no contribution, medium negative contribution, high negative contribution) as illustrated in table 9 below.

Table 9: Potential impact matrix for ICT use in different sectors or areas of human need

Impact area / Application area	MDG 1	MDG 2	MDG 3	MDG 4	MDG 5	MDG 6	MDG 7	MDG 8
Sector 1 / area of human need 1	++	+	–	++	++	– –	++	++
Sector 2 / area of human need 2	+	+/–	++	+/–	+	–	++	+
Sector 3 / area of human need 3	++	–	+/–	++	+/-	+/–	+/–	–
Sector 4 / area of human need 4	+	+/–	–	–	+	++	–	+/–

high positive contribution (++), medium positive contribution (+), low/no contribution (+/–), medium negative impact (–), high negative impacts (– –)

Streamlined measurement procedures

To address the challenge of transparency of information identified above, streamlined measurement procedures need to be developed and/or applied to ensure the criteria of accuracy, neutrality, completeness and comparability are satisfied. The aim is to remove situations of doubt and arbitrariness such that two people compiling the information shall reach the same results, independent of their professional and motivational background.

To achieve this aim, standards and protocols play a key role. Institutions that could organise the development of such standards include ICT sector organisations, the GRI or multinational organisations (e.g. OECD). Specific standards and protocols that would prove valuable include:

- Developing Technical Protocols for the GRI Telecommunication Sector Supplement
- Extending the ISO LCA standards with sector-specific supplements
- Improving the ICT sector definition on the international level
- Regarding application case studies, standard procedures for compilation and descriptions of quantified information are needed.

Furthermore, methodological information should be provided in a consistent manner when communicating quantitative information. Extending external verification efforts and improving existing audit schemes can make data more transparent and thus, more credible for outside actors.

Finally, the ICT sector could position itself as a front-runner in ICT-driven sector assessment standards and systems, by, for instance, XML description of indicator sets or development of software tools and platforms for data compilation and further processing.

Next steps to take

This chapter outlines some concrete steps drawing on the improvement approaches suggested above. Actions are presented both at the sector and company level. At the company level, special attention is placed on the identification of the business case for quantifying ICT sector contributions to the MDGs.

Set up a sector level reporting system

Based on the existing sustainability indicators and the suggested indicator set, ICT sector reports can be important tools for continuous improvement of sustainability information on ICT, thereby responding to increasing demand for relevant and transparent information. Both at the regional and global level, information should be collected and presented in a sector report (see figure 7), which enables the linking of micro-macro level effects and provides a more holistic picture of the indirect and systemic effects of ICT. Such sector level reports with a value chain-wide perspective can supplement efforts of single companies to quantify and communicate impacts in their value chain.

Consistency in data-gathering procedures is a precondition for the aggregation of indicators at the sector level. Indicator protocols should be followed as described above in *streamlined measurement procedures*. Use of a consistent database will serve as a basis for aggregating detailed data from production sites and at the company level.

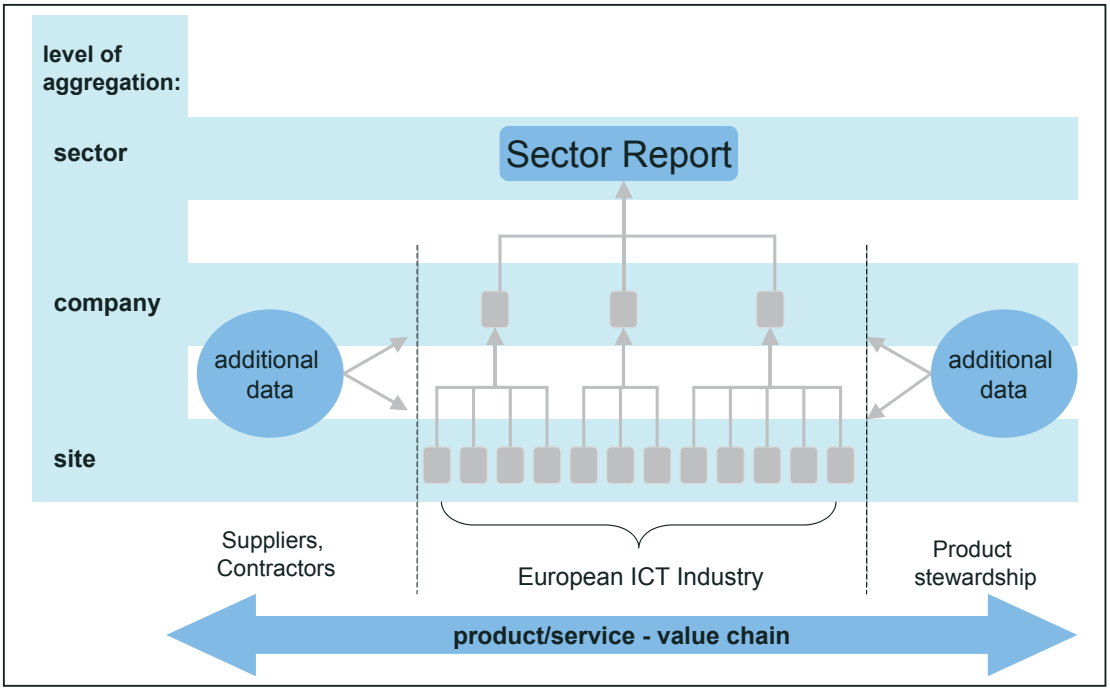

Figure 7: Aggregation of data for sector level reporting. (Source: Own compilation)

Consider regional aspects

The suggested indicator set has a global perspective. It should be further adjusted to integrate specific regional circumstances and perspectives for the following reasons:

- The regional importance of sustainability aspects may differ. This can be due to geographic (e.g. in the case of fresh water consumption), economic (e.g. considering employment effects) or cultural reasons (e.g. collective bargaining).
- Different national economies are integrated in different ways into the ICT value chain. This holds true both for the supply and for the demand side. For example, countries with a large proportion of ICT manufacturing are affected differently by ICT than countries being involved more in ICT service provision.

Considering regional differences has implications on all improvement approaches suggested earlier in this report. Regarding the framework for goals and targets, regional differences are reflected in local stakeholders' positions and specific national or regional agendas that should be considered when selecting sustainability aspects and setting priorities. In different regional settings, different challenges might be identified in the causal chain, such as relating to user readiness or access. The approach suggested in this project for the core indicator set can be used for systematic elaboration of the concretised indicators reflecting actual regional conditions.

Reporting efforts should thus take the various regional variations into account through the development of regional adjustments to existing indicator sets.

Coordinate quantification and reporting efforts at the company level

Stakeholder demands address primarily single companies, sector organisations are rarely subject to public attention and scrutiny. So while coordinated quantification and communication at the sectoral level may be a first-best option in terms of the relevance of information compiled, communicating MDG contributions by single companies remains a challenge and an opportunity for improving the sustainability information within the entire sector.

The relationship between a sector report and company level communication efforts are manifold:

- *Setting priorities for action:* As an example, exceptional low ICT access in a specific group can be taken as a starting point for companies to become active on the issue addressed and show their contribution to future improvements.
- *Benchmarking:* The ability of stakeholders to draw meaningful conclusions on companies' actual impacts and efforts often depends on the availability of data with which to make comparisons. Assessing individual company performance against sector level performance is not only of internal relevance to a company, but strongly improves both relevance and transparency of the information communicated.
- *MDGs and Global Compact:* The MDGs can be linked to a company-specific CSR framework, providing mutual reinforcement for each other. Contributing towards the MDGs can for example be linked with the Ten Principles of the Global Compact.

With individual company accounts of MDG contributions, brand values and corporate image for a company demonstrating responsible behaviour can be reinforced.

Understand the business case of quantifying ICT contributions to the MDGs

While the external perspective on the ICT sector's contribution to the MDGs was assessed in this project, the internal business perspective was not developed. Can businesses gain financially from contributing to the MDGs? What role does quantification have in this context?

To implement products and services allowing for profitable contributions in a long-term perspective going beyond charity and sponsorship, businesses need to link their business goals to the external expectations. Critical to this implementation is the identification of value drivers. Here, quantifying sustainability contributions by the ICT sector can present a business case in two ways:

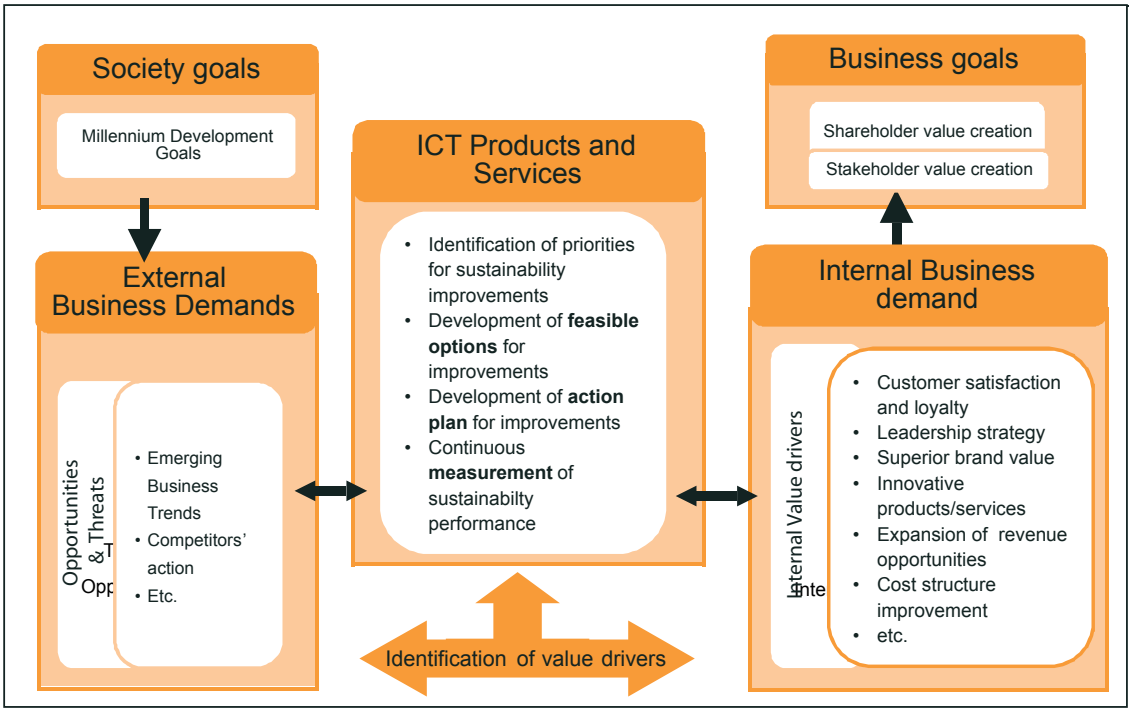

Figure 8: ICT and value drivers between society and business goals.
(Source: adopted from Kuhndt et al.[40])

- Sound quantification helps the businesses to identify profitable opportunities for contributing to the MDGs. Application options with the highest value creation potential can be identified and considered for subsequent implementation. With quantitative data at hand, businesses can assess potential impact on their internal value drivers (see figure above).
- Combining quantification with reporting efforts can create trust and goodwill by a variety of stakeholders, allowing for closer co-operation and interaction. This process can improve a range of intangible assets like brand value, innovation capacity and awareness for external trends. Through external feedback, internal learning processes on intangible assets are fostered.

Future quantification efforts should thus try to link information on MDG contributions to internal company information, thus allowing for innovative steps towards bringing beneficial ICT applications to a wider field of customers.

40 Adapted from Kuhndt, M., Tuncer, B., Stöcker, T.: Identifying value drivers for sustainable business development. Wuppertal Paper, in preparation.

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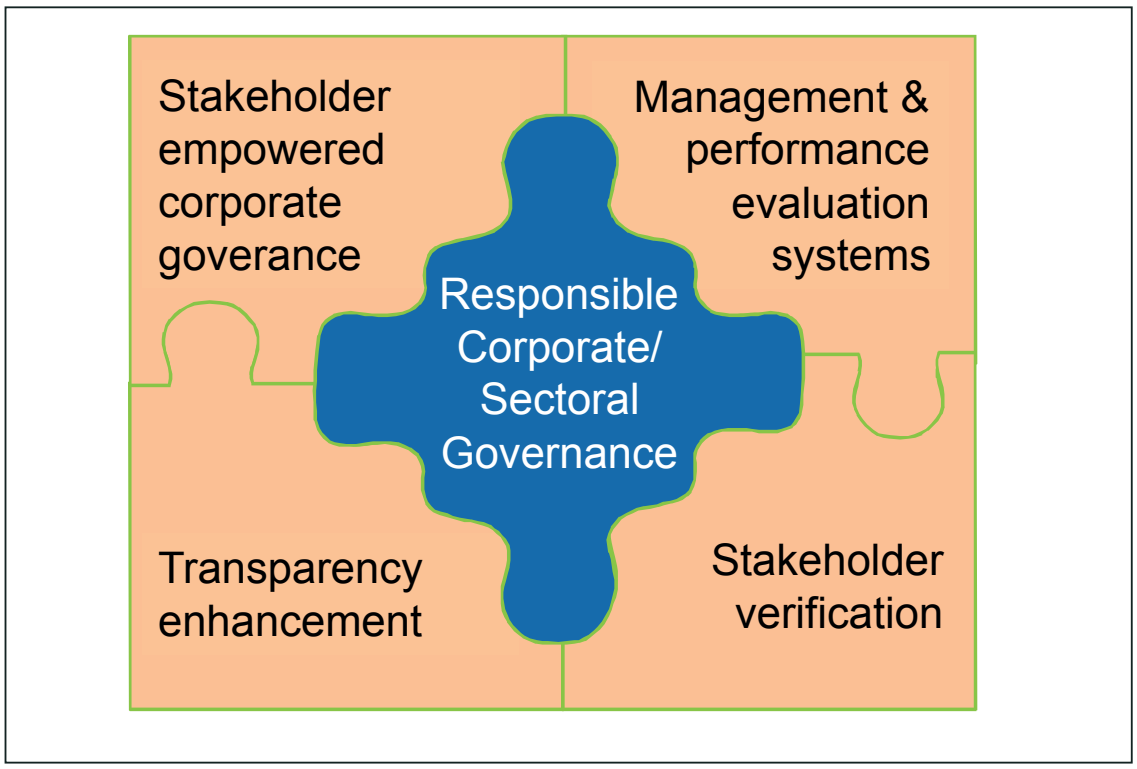
Appendices

Appendix 1: The four elements of Responsible Corporate Governance

Responsible Corporate Governance is evolving as "a stakeholder-oriented policy approach allocating responsibilities to societal actors, who will drive corporate accountability" and describes a framework for how external actors can impact on corporate behaviour. It contains four core elements depicted below.



(Source: Own compilation based on Kuhndt et al.[41])

For *stakeholder empowerment*, all parties affected by the company/sector's actions should be able to participate in a fair way in decision-making and to have their views considered. The highest level of such involvement of stakeholders can be created by network governance structures, at which the management is decentralised through the establishment of the self-governing units in a network. Turnbull argues that the "democratisation of the wealth" in these self-regulating networks is achieved through the involvement of stakeholders that are to replace the shareholders as the only kind of stakeholder in the traditional governance structures[42]. One example to such a network governance structure

41 Kuhndt M.; Tunçer, B.; Andersen, K.; Liedtke C. (2004): Responsible Corporate Governance. An Overview of Trends, Initiatives and State-of-the-art Elements. Wuppertal Paper, Wuppertal Institute, Available at www.wupperinst.org/Publikationen/WP/WP139.pdf

42 Turnbull, S.: A New Way to Govern — Organisations and society after Enron. — New Economics Foundation. London, 2002, p. 49.

could be Mondragon Cooperatives (MCC), which is governed by a network of over 1,000 boards or control centres inside and outside the firm, providing a rich and inclusive web of stakeholder participation[43].

A *set-up of management systems* enables the organisation to integrate stakeholder demands into the daily business routines. Management and performance evaluation systems are required "to review the priority action areas, develop TBL goals, compile relevant tools or instruments to reach these goals, develop routines and action plans, assign responsibilities to business units, departments and personnel and finally review the performance of these systems."[44] There are a variety of tools, among these management systems, to manage environmental aspects, while tools available for managing the social or ethical side are limited. In this respect, sector level supplements of the Global Reporting Initiative (GRI) form good examples. Another example is the stakeholder oriented TBL indicator development for the European Aluminium Industry using the COMPASS measurement system developed by the Wuppertal Institute.[45]

Transparency Enhancement aims at a healthy set-up of informal institutions among the actors of society, hence establishment of trust. It is assumed that when openness of a corporation in terms of triple bottom line aspects is urged, a common understanding of economic, societal and economic problems can be established. The value of external communications in terms of responsible corporate governance would be several such as inter-organisational or inter-sector comparisons, stakeholder engagement and evaluation of potential risks or opportunities. The transparent disclosure of information would allow straightforward comparisons between organisations in the same sector and those in different sectors. Additionally, a continuous dialogue with public institutions, investors, customers, suppliers and employees can be facilitated. Moreover, this process might provide corporations with a self-check and warning for trouble spots or improvement opportunities.

Accountability verification aims to further enhance the informal institutions both inside corporations and in relation to their stakeholders. Credibility and accountability of a corporation can be improved when the progress and the information disclosed is audited by independent third parties. Audits can be conducted by multi-jurisdictional authorities (e.g. AccountAbility, Social Accountability International), financial auditing companies (e.g. PricewaterhouseCoopers, Ernst&Young, KPMG), sustainability indexes (e.g. Dow Jones Sustainability Indexes, FTSE4 Good U.K. Corporate Responsibility Investment

43 Kuhndt M., Tunçer, B.; Andersen, K.; Liedtke, C.: Responsible Corporate Governance: An Overview of Trends, Initiatives and State-of-the-art Elements – What sort of globalisation is sustainable? — Wuppertal Papers No. 139, January 2004, Wuppertal Institute for Climate, Environment and Energy, Wuppertal January 2004

44 Kuhndt, M., Tunçer, B.; Lietdke, C. (2004): A Triple Bottom Line Innovation Audit Tool for ICT Product-Service Mix Applications. Contribution to the Project Life Cycle Approaches to Sustainable Consumption on behalf of the Society of Non-Traditional Technology-Wuppertal 2004

45 Kuhndt M.; von Geibler, J.; Eckermann, A. (2003): Developing a Sectoral Sustainability Indicator Set taking a Stakeholder Approach, Wuppertal Institute for Climate, Environment and Energy, Wuppertal

Index Series, Oekom, Domini Social Index) or local stakeholders, such as NGOs, trade unions (e.g. Social Observatory in Brazil), which usually verify information disclosed in the corporate reports according to a predefined set of standards and information gathered from company managers.

Appendix 2: Sources for status quo of quantified information

Micro-level: Product and service assessment

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- IBM Corporation (2000): Integrating environmental requirements into the supply chain: IBM's ECP initiatives, presented at Electronic Goes Green 2000+ : A Challenge for the Next Millennium, Joint international congress and exhibition, Berlin, September 2000
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Appendix 3: ICT related Opportunities and Threats for Millennium Development Goals

ICT related Opportunities and Threats for Millennium Development Goals. (Source: Own compilation based on literature review)

Opportunities and Threats/Challenges	Sources
Goal 1: Eradicate extreme poverty and hunger	
Opportunities	
O1.1 **Support the private sector in developing countries** Increase efficiency, competitiveness and market access of developing country companies, farmers and traders, especially poor and small-scale actors or those operating in remote areas. For example, ICT can increase access to market information and achieve lower transaction costs, e.g. while obtaining micro credits, or ICT can increase the efficiency of food supply systems by early warning systems of food supply.	• UN ICT Task Force (2003) • UNDP (2004) • Gerster and Zimmerman (2003) • Willard and Halder (2003) • World Bank Group Global ICT Dept. 2003
O1.2 **Integrate developing countries into the world economy** Enhance ability of developing countries to participate in global economy and to exploit comparative advantage in factor availability.	• UN ICT Task Force (2003). • UNDP (2004). • Gerster, G. and Zimmerman, S. (2003). • Willard, T. and Halder, M. (2003). • World Bank Group Global ICT Dept. 2003.
O1.3 **Enhance efficiency of governments and support sound poverty alleviation policies** E-Governance enabled by the use of ICT can improve efficiency and effectiveness of public service delivery and interaction with the private sector and civil society. In specific, ICT can help governments and administrations to create and execute sound poverty alleviation policies.	• UN/DES (2002) • Willard, T. and Halder, M. (2003). • UNDP (2004). • Gerster, G. and Zimmerman, S. (2003).
O1.4 **Support good governance and social cohesion** ICT can create an enabling environment through fostering transparency, accountability and information sharing, e.g. by improving educational opportunities to improve capabilities to participate in democratic systems as well as supporting community decision making/participation. ICTs can supplement and strengthen social capital of civil society, contributing to social cohesion.	• Willard, T. and Halder, M. (2003). • ECOTEC (2004)
Threats and challenges	
T1.1 **Deeper digital divide, within and between countries** Benefits from technological resources, tools and gain knowledge to generate and distribute information could me predominately realised by today's high-income countries and poor countries elites respectively.	• WWF (2002) • FFF (2003)

Opportunities and Threats/Challenges	Sources
Goal 2: Achieve universal primary education	
Opportunities	
O2.1 **Enhance access to information for teaching** ICT can make quality educational material/resources broadly available to teachers and pupils. ICT enables distance training of teachers and networks that link teachers to their colleagues.	• UN ICT Task Force (2003) • UNESCO (2004)
O2.2 **Enhance efficiency of education administration** through strategic application of technologies and ICT-enabled skill development; through the use of databases and networks, curricula can be developed collaboratively, education materials procured more cost effectively, staff and student time can be scheduled more efficiently and individual student performance can be monitored more closely.	• UN ICT Task Force (2003) • Digital Opportunity Task Force (2001) • UN/DES (2002) • UNESCO (2004)
O2.3 **Bring education to remote regions and socially excluded groups** By provision of education through channels outside the traditional system, e.g. to women or groups with special vocational and educational needs and digital delivery of education to remote areas. This bears special relevance for countries with vast rural or un-navigable areas and/or social inequality. ICT can also lead to better services for special educational needs.	• World Bank Group Global ICT Dept. 2003 • UNDP (2004) • UNESCO (2004)
Threats and challenges	
T2.1 Asymmetrical distribution of benefits/ illiteracy It is the economically, politically and socially powerful that will benefit from the advantages of ICT in the education sector. For applying ICT, a significant level of knowledge is needed. Not only must ICT contribute to education, but education must provide knowledge on ICT application. Institutions are needed that ensure equal social access to ICT enhanced education benefits.	• BT (2004) • Forum for the Future (2003) • UNESCO (2004)
T2.3 **Side-Effects on educational policy** Dangers include crowing-out of more traditional spending more relevant for (books, teachers) and resource shifting to ICT in secondary and tertiary education, as the role of teachers in the education process at primary level cannot be substituted by technology, utilising the potential of ICT is important for enhancing teacher's capacities to achieve education goals.	• Adeya, CN. (2002) • UNDP (2004) • UNESCO (2004)

Opportunities and Threats/Challenges	Sources
Goal 3: Promote gender equality and empower women	
Opportunities	
O3.1 **Enhance access to education for women** Delivering educational and literacy programmes specifically targeted to poor girls and women using appropriate technologies helps to eliminate the distance between women and information and overcoming cultural barriers to the acquisition of knowledge (strategic and practical needs). Includes vocational and schooling programmes targeted at girls outside traditional school environment (e.g. using community centres in villages, telecentres, etc.)	• UN ICT Task Force (2003) • UNDP (2004) • World Bank Group Global ICT Dept. 2003 • Adeya, CN. (2002) • Moser, CON. (1998)
O3.2 **Enhance access to employment for women** by opening new dimension of employment opportunities for women trying to combine family obligations with an active work life.	• UNDP (2004) • World Bank Group Global ICT Dept. 2003
O3.3 **Enable women's advocacy and support groups** to exchange information, co-ordinate action and access information sources of foreign or international women's organisations.	• UNDP (2004)
O3.4 **Foster awareness for women's issues** by raising political awareness, providing a platform for political discussion and through information/ communication programmes using a range of ICTs. Women's advocacy groups can increase the reach of campaigns and influence public opinion on gender equality. Female political candidates can win support by utilising this tool.	• UNDP (2004) • World Bank Group Global ICT Dept. 2003 • UN ICT Task Force (2003)
Threats and challenges	
T3.1 **Ensure women are empowered to apply technology** Often women have to play catch-up with men when new technologies are introduced therefore deliberate policies are needed for example, ensuring girls get involved in science and technology at an early age. It is women and children who suffer the most when social and technical services breakdown in developing countries.	• Adeya, CN. (2002)

Opportunities and Threats/Challenges	Sources
Goal 4: Reduce child mortality **Goal 5: Improve maternal health** **Goal 6: Combat HIV/AIDS, malaria and other diseases**	
Opportunities	
O4.1 **Enhance access to information for health workers** Give health care workers greater access to information needed to treat or prevent disease, e.g. diarrhoeal or preventable communicable diseases. ICT can reduce the IMR and child mortality through increased options and information. Applications and access of rural care-givers to specialist support and remote diagnosis. This is especially useful for remote primary health care facilities, which can be linked to specialists at tertiary health care facilities.	• UN ICT Task Force (2003). • UNDP (2004). • World Bank Group Global ICT Dept. 2003
O4.2 **Enhance access to information for general population** Increase access to health information, through locally-appropriate content in local languages. Includes information on reproductive health and AIDS prevention, through locally appropriate content in local languages.	• UNDP (2004). • Gerster, G. and Zimmerman, S. (2003). • Willard, T. and Halder, M. (2003). • UN ICT Task Force (2003).
O4.3 **Enhance handling of health information** ICT can help public health administrations and hospitals to handle health information better. This can prevent disease by effective monitoring and response mechanisms. Daily monitoring can help plan responses like vaccinations or environmental health response teams. Research done on tropical disease or malaria done in Northern countries can be conducted by cases/data being sent to these research institutes in for documentation. ICT can improve hospital administration's efficiency through better databases management, e.g. concerning patient records or medical procurement and stock information.	• UNDP (2004) • Digital Opportunity Task Force (2001) • UN ICT Task Force (2003). • UNDP (2004). • Gerster, G. and Zimmerman, S. (2003). • Willard, T. and Halder, M. (2003).
Threats and challenges	
T4.1 **Asymmetrical distribution of benefits** It is the economically, politically and socially powerful that will benefit from the advantages of ICT in the health sector. Institutions are needed that ensure equal social access to ICT enhanced health benefits.	• UNDP (2004).
T4.2 **Crowding out of traditional health spending** Concerns are raised that money spent on ICT may be siphoned from tangible work like the costs of care, treatment, education and prevention. In addition ICTs are a tool that must accompany good programmes.	• Adeya, CN. (2002)

Opportunities and Threats/Challenges	Sources
Goal 7: Ensure environmental sustainability	
Opportunities	
O7.1 **Improved monitoring and policy enforcement** Better monitoring, resource management, mitigation of environmental risks and environmental enforcement by using remote sensing technologies and communications networks.	• UN ICT Task Force (2003). • UNDP (2004). • World Bank Group Global ICT Dept. 2003 • Willard, T. and Halder, M. (2003). • FFF (2003) • Langrock, T. Ott, H. Dworak, T. (2002)
O7.2 **Increase awareness of sustainable development** Addresses are policy makers, practitioners, consumers and advocacy groups. ICT-supported education programmes can change consumer attitudes, values and behaviour.	• UN ICT Task Force (2003) • Digital Opportunity Task Force (2001) • Willard, T. and Halder, M. (2003).
O7.3 **Facilitate knowledge exchange and networking** among policy makers, practitioners, citizens and advocacy groups. Policy makers rely on information of products so as to design policy to steer demand in an environmentally advantageous direction. The public can voice its demand for environmental improvements to the government.	• UN ICT Task Force (2003)
O7.4 **Efficiency-enhancing ICT applications** Improvements design processes, improved inventory management, improved logistics, reduced land use for buildings and better building management can reduce environmental impacts of organisations.	• FFF (2003) • Willard, T. and Halder, M. (2003). • Romm, J. (2002) • GRI (2003)
O7.5 **Structural change of economic systems** Growth can be shifted from energy intensive industries to the IT sector including computer manufacture and software development.	• Romm, J (2002)

Opportunities and Threats/Challenges	Sources
Threats and challenges	
T7.1 Direct environmental impacts along life-cycle (sourcing, manufacturing, operation and end-of-life). Impacts include: • Energy use • GHG emissions • Land use • Material and water consumption • Wastewater discharge, air emissions, solid waste discharge • Biodiversity impacts • Toxic release impacts	• Cohen, N (2002). • Wuppertal Institute (2003)
T7.2 Indirect environmental impacts Re-materialisation, direct and indirect rebound-effects, transporting-inducing changes in production and consumption patterns.	• GIANI (2004), p. 30 • WWF (2002) • Wuppertal Institute (2003)
T7.3 Unsure indirect and systemic aspects ICT is a relatively new field, which penetrates and fundamentally alters a wider range of social and economic activities. For example, the practice and the technology for e-commerce are rapidly developing, thus long term impacts are as yet unknown. Policy to reduce possible indirect and systemic effects thus may prove more challenging than tackling direct effects.	• Cohen, N (2002). • Fichter, K. (2001) • Wuppertal Institute (2003)

Opportunities and Threats/Challenges	Sources
Goal 8: Develop a global partnership for development	
Opportunities	
O8.1 **Trading and financial system** Use ICT for information sharing, discussion groups, and access to specialised data bases dealing with the development of an open, rule-based, predictable, non-discriminatory trading and financial system.	• UN ICT Task Force (2003) • World Bank Group Global ICT Dept. 2003 • GRI (2004)
O8.2 **Official Development Assistance** Use ICT for information sharing, discussion groups, and access to specialised data bases dealing with how to address the special needs of the least developed countries.	• UN ICT Task Force (2003)
O8.3 **Market access for "remote" countries** Use ICT for information sharing, discussion groups, and access to specialised data bases dealing with addressing the special needs for landlocked countries and small island states. Enable LDCs, landlocked countries and small islands to link up with the global market to accelerate their progression and full integration into the world economy.	• UN ICT Task Force (2003)
O8.4 **Enable civil-society networks** Enable national and international networks and coalitions that work consensually to develop sustainable policy positions. They draw support from a wide range of individuals and institutions with similar objectives. Participants can include actors from public sectors, businesses, trade unions and NGOs.	• Genoa Plan of Action-Report (2001) • GRI (2004) • Digital Opportunity Task Force (2001)
O8.5 **Provide Distance working opportunities** Promote distance working facilitated by ICT to create service-sector jobs in developing countries in such industries as call centres, data entry and processing and software development.	• UN ICT Task Force (2003) • FFF (2003)
O8.6 **Integration into the ICT value chain** Value chains in the ICT sector are increasingly crossing national boundaries. ICT suppliers can be significant providers of employment, value creation and foreign currencies for developing countries.	• Digital Opportunity Task Force (2001)

Opportunities and Threats/Challenges	Sources
Threats and challenges	
T8.1 **Access in remote areas** Access to ICT is crucial in remote areas, as people there often lack physical access to traditional health, education and general resources.	• FFF (2003) • GIANI (2004)
T8.2 **Traditionally excluded societal groups** Standard ICT equipment can be inappropriate for certain groups in society. These are often marked by language, culture, illiteracy, lacking education, income, disabilities, and age. ICT should be try to reach a number of groups as wide as possible. Combine low and high technology to achieve relative ubiquity of access to effective and affordable information and communication technology tools.	• BT (2004) • GIANI, (2004) • FFF (2003)
T8.3 **Preconditions for absorption of ICT** Organisational change is needed to accompany the use of ICT. High technology is not the essential element to success, but co-operation and communication are required to materialise enhanced productivity. A culture of innovation and change is needed in order to support the creative destruction made possible by ICTs. Thus appropriate institutions and accompanying investment in skills, reorganisation of companies and administrations is needed alongside the investment in ICTs.	• ECOTEC (2004) • Adeya, CN. (2002)
T8.4 **ICT investments in poor countries** Spreading the use of ICT requires sufficient investment while the investment capacity of most poor countries is low, sometimes foreign investment is required. There also exists a time lag between investment and returns, thus investors with a longer perspective are needed. Concerning ICTs contribution to poverty alleviation, private investors will more likely to provide their products and services to rich parts of the population where poverty alleviation effects are unlikely.	• ECOTEC (2004) • GIANI (2004), p. 18 • FFF (2003)
T8.5 **Virtual vice** ICT can be abused, for illegal activities like hacking, copy-right infringement and spam as well as facilitating other (international) crimes.	• BT (2004) • GIANI (2004)

Appendix 4: Identified indicators for the contribution of the ICT sector to sustainability (the Millennium Development Goals)

The following table depicts ICTs contribution to the eight Millennium Development Goals. For each goal, Opportunities as well as Threats/Challenges are listed separately (Column a). Each of these points is linked to a series of Meso- and Macro-Indicators (Column b) and Micro-Indicators (Column c). The numbering reads as: O x.y: Goal x, Opportunity number y, T x.y: Goal x, Threat/Challenge number y. The Opportunities and Threats/Challenges are broadly based on UN ICT Task Force (2003). The Indicators are sourced from a variety of documents, Micro-Indicators come predominately from the GRI telecommunication sector supplement

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
O1.1 Support the private sector in developing countries Increase efficiency, competitiveness and market access of developing country companies, farmers and traders, especially poor and small-scale actors or those operating in remote areas. For example, ICT can increase access to market information and achieve lower transaction costs, e.g. while obtaining micro credits, or ICT can increase the efficiency of food supply systems by early warning systems of food supply. • UN ICT Task Force (2003) • UNDP (2004) • Gerster and Zimmerman (2003) • Willard and Halder (2003) • World Bank Group Global ICT Dept. 2003 • OECD (2004) • World Bank Group (2004) • European Parliament (2001)	• Correlation of average income with ICT as % of GDP (UN ICT, 2003) • PRSPs (poverty reduction strategy papers) that include ICTs (UN ICT, 2003) • Percentage of private sector companies with access to affordable ICTs (notable SMEs) (World Bank Group 2004) • B-1 Proportion of businesses using computers (WSIS 2005) • B-2 Proportion of employees using computers (WSIS 2005) • B-3 Proportion of businesses using the Internet (WSIS 2005) • B-4 Proportion of employees using the Internet (WSIS 2005) • B-5 Proportion of businesses with a website (or web presence where the business has control over the content) (WSIS 2005) • B-6 Proportion of businesses with an intranet (WSIS 2005) • B-7 Proportion of businesses receiving orders over the Internet (WSIS 2005) • B-8 Proportion of businesses placing orders over the Internet (WSIS 2005) • B-9 Proportion of businesses accessing the Internet by modes of access (WSIS 2005) • B-10 Proportion of businesses with a Local Area Network (LAN) (WSIS 2005) • B-11 Proportion of businesses with an	• HR1: Description of policies, guidelines, corporate structure, and procedures to deal with all aspects of human rights relevant to operations, including monitoring mechanisms and results. (GRI, 2002) • HR3: Description of policies and procedures to evaluate and address human rights performance within the supply chain and contractors, including monitoring systems and results of monitoring. (GRI, 2002) • HR14: Share of operating revenues from the area of operations that are redistributed to local communities. (GRI, 2002) • PR1: Description of policy for preserving customer health and safety during use of products and services, the extent to which this policy is visible and applied, description of procedures/programmes to address this issue, including monitoring systems and results thereof. (GRI, 2002) • LA1: Breakdown of workforce by region, country, status, employment type and employment contract. (GRI, 2002) • LA2: Net employment creation and average turnover segmented by region

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
	extranet (WSIS 2005) • B-12 Proportion of businesses using the Internet by type of activity (WSIS 2005) Response categories: - Internet e-mail - Getting information ▪ About goods or services ▪ From government organisations/public authorities via websites or e-mail ▪ Other information searches or research activities - Performing Internet banking or accessing other financial services - Dealing with government organisations/public authorities • - Providing customer services • - Delivering products online	(GRI, 2002) • LA12: Employee benefits beyond those legally mandated. (GRI, 2002) • EC11: Supplier breakdown by organisation and country. (GRI, 2002) • HR7: Breakdown of workforce by region, country, status, employment type and employment contract. See ILO Convention No. 29. Article 2. (GRI, 2002)
O1.2 Integrate developing countries into the world economy Enhance ability of developing countries to participate in global economy and to exploit comparative advantage in factor availability • UN ICT Task Force (2003). • UNDP (2004). • Gerster, G. and Zimmerman, S. (2003). • Willard, T. and Halder, M. (2003). • World Bank Group Global ICT Dept. 2003. • Addison and Heshmati (2002) •	• Imports of goods and services (% of GDP) (UNDP 2004) • Exports of goods and services (% of GDP) (UNDP 2004) • Primary exports (% of merchandise exports) (UNDP 2004) • Manufactured exports (% of merchandise exports) (UNDP 2004) • High-technology exports (% of manufactured exports) (UNDP 2004)	• EC5: Total payroll and benefits broken down by country and region. (GRI, 2002)
O1.3 Enhance efficiency of governments and support sound poverty alleviation policies E-Governance enabled by the use of ICT can improve efficiency and effectiveness of public service delivery and interaction with the private	• Documented standards and classifications (World Bank Group 2004) • No. of jobs and resumes posted on the Web (World Bank Group 2004) • Percent of people searching for or finding	• Lending to or partnering in investment for e-government (UN/DES, 2002) • Initiatives to enable access to formal capital markets and venture capital (UN/DES, 2002)

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
sector and civil society. In specific, ICT can help governments and administrations to create and execute sound poverty alleviation policies. • UN/DES (2002) • Willard, T. and Halder, M. (2003). • UNDP (2004). • Gerster, G. and Zimmerman, S. (2003). • OECD (2004) • World Bank Group (2004) • Shadrach and Ekeanyanwu (2003) • UN Millenium Project (2005) • European Parliament (2001)	their jobs through web sites (World Bank Group 2004) • Percentage of local government offices equipped with public assess terminals (World Bank Group 2004) • Percentage of central and local government agencies online (World Bank Group 2004) • Percentage of government services that can be delivered through ICTs (phone, e-mail and internet) (World Bank Group 2004) • Web Measure Index, aggregate index of government ministries with online services available (UNPAN 2003) • Government Internet access and Web sites (NECTEC/NSTDA 2002) • Internet and e-Mail access in the public and private sector (NECTEC/NSTDA 2002) • Employees per PC in the central government (NECTEC/NSTDA 2002) •	• Activities as intermediary for digital transactions between businesses and government and citizens and government (UN/DES, 2002) • Co-operation with governments introducing e-Government (offer information and communication technologies and consultancy services) (UN/DES, 2002) • Amount provided to direct activities in support of society, and amount provided in support or in kind (BT 2004) •
O1.4 Support good governance and social cohesion ICT can create an enabling environment through fostering transparency, accountability and information sharing, e.g. by improving educational opportunities to improve capabilities to participate in democratic systems as well as supporting community decision making/participation. ICTs can supplement and strengthen social capital of civil society, contributing to social cohesion. • Willard, T. and Halder, M. (2003). • ECOTEC (2004) • OECD (2004) • Shadrach and Ekeanyanwu (2003) • European Parliament (2001)	• E-Participation Index, assessment of a total of 21 citizen information an participatory services and facilities (UNPAN 2003) • Percentage of population rating politicians and public servants as trustworthy (Shadrach & Ekeanyanwu 2003) • Corruption Perception Index (Transparency International)	• Amount provided to direct activities in support of society, and amount provided in support or in kind (BT 2004) •

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
T1.1 Deeper digital divide, within and between countries Benefits from technological resources, tools and gain knowledge to generate and distribute information could me predominately realised by today's high-income countries and poor countries elites respectively. • WWF (2002) • FFF (2003)		•
O7.1 Improved monitoring and policy enforcement Better monitoring, resource management, mitigation of environmental risks and environmental enforcement by using remote sensing technologies and communications networks. • UN ICT Task Force (2003). • UNDP (2004). • World Bank Group Global ICT Dept. 2003 • Willard, T. and Halder, M. (2003). • FFF (2003) • Langrock, T. Ott, H. Dworak, T. (2002) • World Bank Group (2004)	• Public involvement in environmental monitoring – No. of violations reported (World Bank Group 2004) • Extend of environmental information online (World Bank Group 2004) • Percentage of workers telecommuting (World Bank Group 2004)	• Initiatives exceeding the requisites of the law (Telefonica, 2003) •
O7.2 Increase awareness of sustainable development Addresses are policy makers, practitioners, consumers and advocacy groups. ICT-supported education programmes can change consumer attitudes, values and behaviour. • UN ICT Task Force (2003)	•	• PA11: Initiatives to inform customers about product features and applications that will promote responsible, efficient, cost effective, and environmentally preferable use. (GRI, 2003); (Telefonica, 2003) • Number of CSR workshops for supply-chain managers (Vodafone 2003/04)

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
• Digital Opportunity Task Force (2001) • Willard, T. and Halder, M. (2003).		• Supplier surveys (BT, 2004) • % of signatories of initiative that take environmental consideration into account for sponsorship (ETNO, 2002) • % of signatories of initiative that market products emphasising a positive environmental impact. (ETNO, 2002) • Number of measures implemented to promote Global Compact (DT, 2004)
O7.3 Facilitate knowledge exchange and networking among policy makers, practitioners, citizens and advocacy groups. Policy makers rely on information of products so as to design policy to steer demand in an environmentally advantageous direction. The public can voice its demand for environmental improvements to the government. • UN ICT Task Force (2003)		• PA11: Initiatives to inform customers about product features and applications that will promote responsible, efficient, cost effective, and environmentally preferable use. (GRI, 2003); (Telefonica, 2003) • % of signatories of initiative that have environmentally focused communication (ETNO, 2002) • % of signatories of initiative that have training programmes in place (ETNO, 2002)
O7.4 Efficiency-enhancing ICT applications Improvements design processes, improved inventory management, improved logistics, reduced land use for buildings and better building management can reduce environmental impacts of organisations. • FFF (2003) • Willard, T. and Halder, M. (2003). • Romm, J. (2002) • GRI (2003)	• Percentage of enterprises using e-learning applications for training and education of employees (European Commission, 2002) • Teleworkers as percentage of total in employment (ITU, 2003) • Number of polluted water supplies found through the use of ICTs (ITU, 2003) • New sources of fresh water discovered through ICTs (ITU, 2003) • Amount of drinkable water conserved through ICTs (ITU, 2003)	• TA1. Provide examples of the resource efficiency of telecommunication products and services delivered. (GRI, 2003); (BT, 2004); (Telefonica, 2003) • TA2. Provide examples of telecommunication products, services and applications that have the potential to replace physical objects (e.g. a telephone book by a database on the web or travel by videoconferencing) (GRI, 2003); (BT, 2004); (Telefonica, 2003)

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
		• TA 3. Disclose any measures of transport and/or resource changes of customer use of the telecommunication products and services listed above. Provide some indication of scale, market size, or potential savings. (GRI, 2003); (BT, 2004); (Telefonica, 2003) • 3.16 Policies and systems for managing upstream and downstream impacts, including: - Supply chain management as it pertains to outsourcing and supplier environment and social performance; and - Product and service stewardship initiatives. Stewardship initiatives include efforts to improve product design to minimise negative impacts associated with manufacturing, use and final disposal. (GRI); (BT, 2004); (DT, 2004); (Telefonica, 2003); (Vodafone 2003/04) • % of signatories of initiative that try to innovate by minimising impact on the environment (ETNO, 2002) • Number of services identified with potential to contribute to sustainability (DT, 2004) • Number of telework jobs (DT, 2004)
O7.5 Structural change of economic systems Growth can be shifted from energy intensive industries to the IT sector including computer manufacture and software development. • Romm, J (2002)	• GDP per unit of energy use (US$ per kg of oil equivalent) (UNDP 2004) • Carbon dioxide emissions per capita (metric tons) (UNDP 2004) • Carbon dioxide emissions, Share of world total (%) (UNDP 2004)	

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
	al. 2003) • Direct and cumulated CO2-emissions and primary energy use by the ICT sector (Kuhndt et al. 2003) • Intermediate use of ICT goods and services by sectors with significant environmental impacts (Kuhndt et, al 2003 • ICT investments by sectors with significant environmental impacts (Kuhndt et, al 2003) • Share of e-business in consumer sales by sectors (Kuhndt et, al 2003)	

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
T7.1 Direct environmental impacts along whole life-cycle, spanning sourcing, manufacturing, operation and end-of-life. Impacts include: • Energy use • GHG emissions • Land use • Material and water consumption • Wastewater discharge, air emissions, solid waste discharge • Biodiversity impacts • Toxic release impacts • Cohen, N (2002) • Wuppertal Institute (2003)	• Energy use (kg oil equivalent) per $1 GDP (PPP) (ITU 2003) • Carbon dioxide emissions (per capita) and consumption of ozone-depleting CFCs (ITU 2003) • Percentage of enterprises using e-learning applications for training and education of employees (European Commission, 2002) • Teleworkers as percentage of total in employment (ITU, 2003) • Energy use of ICT as percentage of total energy use () • Energy use of the internet as percentage of total energy use ()	• Environmental indicators (GRI, 2004); (BT, 2004); (DT, 2004) ; (Telefonica, 2003) ; (Vodafone 2003/04) • Global warming $C0_2$ emissions (BT, 2004) • Waste recycle and waste to landfill (BT, 2004) • Electricity use and source (BT, 2004) • Significant environmental impacts of principal products and services (Telefonica, 2003) • Electric power consumption (Telefonica, 2003) • Water consumption (Telefonica, 2003) • Paper consumption (Telefonica, 2003) • Greenhouse effect gases emissions (Telefonica, 2003) • CO2 emissions from network operations and offices (millions of tonnes) (direct and indirect) (Vodafone, 2003/04) • No. of vehicles in vehicle fleet (Telefonica, 2003), (BT 2004) • CO2 emissions from company cars (tonnes) (Vodafone, 2003/04) • Electricity use in relation to overall turnover (ETNO, 2002) • Amount of Electricity Used by each Company/Company Turnover divided by number of signatories (ETNO, 2002) • Energy per unit turnover (ETNO, 2002) • CO2 produced in grammes per euro of turnover (ETNO, 2002) • Overall amount of vehicles fuels used divided by overall turnover (ETNO, 2002)

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
		• Amount of Vehicle Fuels Used by Each Company/Company Turnover divided by number of signatories (ETNO, 2002) • Policies and systems for managing upstream and downstream impacts, including: • - Supply chain management as it pertains to outsourcing and supplier environment and social performance; and • - Product and service stewardship initiatives. Stewardship initiatives include efforts to improve product design to minimise negative impacts associated with manufacturing, use and final disposal. (GRI); (BT, 2004); (DT, 2004); (Telefonica, 2003); (Vodafone 2003/04) • Supply Chain Management: compliance with WEEE and RoHS (BT, 2004) • Policies and/or systems for managing upstream ang downstream impact (Telefonica, 2003) • % of signatories of initiative that have an environment-focused supplier programs in place (ETNO, 2002) • % of signatories of initiative that verify the supplier's environmental performance (ETNO, 2002)
T7.2 **Indirect environmental impacts** Re-materialisation, rebound-effects, transporting-inducing changes in production and consumption patterns. • GIANI (2004), p. 30	• Proportion of population using solid fuels (ITU 2003) • National paper consumption per capita (generic)	• TA4. Disclose any estimates of the rebound effect (indirect consequences) of customer use of the products and services listed above, and lessons learned for future development. This may include social consequences as

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
		2004); (Telefonica, 2003) • Policies and systems for managing upstream and downstream impacts, including: • - Supply chain management as it pertains to outsourcing and supplier environment and social performance; and • - Product and service stewardship initiatives. Stewardship initiatives include efforts to improve product design to minimise negative impacts associated with manufacturing, use and final disposal. (GRI); (BT, 2004); (DT, 2004); (Telefonica, 2003); (Vodafone 2003/04)
T7.3 Unsure indirect and systemic aspects ICT is a relatively new field, which penetrates and fundamentally alters a wider range of social and economic activities. For example, the practice and the technology for e-commerce are rapidly developing, thus long term impacts are as yet unknow. Policy to reduce possible indirect and systemic effects thus may prove more challenging than tackling direct effects. • Cohen, N (2002). • Fichter, K. (2001)	-	• TA 4. Disclose any estimates of the rebound effect (indirect consequences) of customer use of the products and services listed above, and lessons learned for future development. This may include social consequences as well as environmental. (GRI, 2003); (BT, 2004); (Telefonica, 2003) • Proportion of collected mobile phones reused (Vodafone, 2003/04) • Number of base stations (Vodafone, 2003/04) • Number of mobile phones collected (million) (Vodafone, 2003/04) • Proportion of network equipment waste reused and recycled (Vodafone, 2003/04) • Proportion of paper purchased with a

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
		(Vodafone, 2003/04)
O8.1 Trading and financial system Use ICT for information sharing, discussion groups, and access to specialised data bases dealing with the development of an open, rule-based, predictable, non-discriminatory trading and financial system • UN ICT Task Force (2003) • World Bank Group Global ICT Dept. 2003 • GRI (2004)	• Imports of goods and services (% of GDP) (UNDP 2004) • Exports of goods and services (% of GDP) (UNDP 2004) • Primary exports (% of merchandise exports) (UNDP 2004) • Manufactured exports (% of merchandise exports) (UNDP 2004) • High-technology exports (% of manufactured exports) (UNDP 2004)	•
O8.2 Official Development Assistance Use ICT for information sharing, discussion groups, and access to specialised data bases dealing with how to address the special needs of the least developed countries • UN ICT Task Force (2003)	• Resource Flows to Developing Countries split by type (Official Development Assistance, Other Official Flows, Net Grants by NGOs, Direct Investment, International Bank Lending, Bond lending, Other Private) (OECD 2005)	•
O8.3 Market access for "remote" countries Use ICT for information sharing, discussion groups, and access to specialised data bases dealing with addressing the special needs for landlocked countries and small island states. Enable LDCs, landlocked countries and small islands to link up with the global market to accelerate their progression and full integration into the world economy. • UN ICT Task Force (2003)	• Imports of goods and services (% of GDP) (UNDP 2004) • Exports of goods and services (% of GDP) (UNDP 2004) • Primary exports (% of merchandise exports) (UNDP 2004) • Manufactured exports (% of merchandise exports) (UNDP 2004) • High-technology exports (% of manufactured exports) (UNDP 2004)	• PA4: Quantify the level of availability of telecommunications products and services in areas where the organisation operates. Examples include: customer number//market share, addressable market, percentage of population covered, percentage of land covered. (GRI, 2003); (BT, 2004); (Telefonica, 2003) •
O8.4 Enable civil-society networks Enable national and international networks and coalitions that work consensually to develop sustainable policy positions. They draw support from	• Percentage of NGOs offering information via ICT, especially internet services (generic) • Projects and campaigns linking NGOs	• Initiatives to improve connectivity and uptake of ICT in NGOs (generic) • EC10.Donations to community, civil

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
a wide range of individuals and institutions with similar objectives. Participants can include actors from public sectors, businesses, trade unions and NGOs. • Genoa Plan of Action-Report (2001) • GRI (2004) • Digital Opportunity Task Force (2001)	(generic) • Percentage of NGOs with access to basic ICT infrastructure (telephone, internet) (generic)	society, and other groups broken down in terms of cash and in-kind donations per type of group. (GRI 2002)
O8.5 **Provide Distance working opportunities** Promote distance working facilitated by ICT to create service-sector jobs in developing countries in such industries as call centres, data entry and processing and software development. • UN ICT Task Force (2003) • FFF (2003)	• Unemployment rate (% of labour force), (UNDP 2004) • Youth unemployment rate (% of labour force ages 15 - 24) (UNDP 2004) • Long-term unemployment rate (% of labour force) (UNDP 2004)	•
O8.6 **Integration into the ICT value chain** Value chains in the ICT sector are increasingly crossing national boundaries. ICT suppliers can be significant providers of employment, value creation and foreign currencies for developing countries.	• ICT-1 Proportion of total workforce involved in the ICT sector (WSIS 2005) • ICT-2 Value added in the ICT sector (as a percentage of total value added) on national basis (WSIS 2005) • ICT-3 ICT goods imports as a percentage of total imports (WSIS 2005) • ICT-4 ICT goods exports as a percentage of total exports (WSIS 2005)	•
T8.1 **Access in remote areas** Access to ICT is crucial in remote areas, as people there often lack physical access to traditional health, education and general resources.	• Percentage of population who regularly use the Internet (European Commission, 2002) • Percentage of households with internet access at home (European Commission,	• IO1: Investment in telecommunication network infrastructure broken down by country/region. (GRI, 2003); (BT, 2004); (Telefonica, 2003); (Vodafone 2003/04, partly)

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
• FFF (2003) • GIANI (2004)	2002) • Number and percentage of households with service coverage in rural areas (World Bank Group 2004) • Telecommunication Infrastructure Index, weighted average index of six primary indices based on basic ICT-related infrastructure indicators (UNPAN 2003)	• IO2: Net costs for service providers under the Universal Service Obligation when extending service to geographic locations and low-income groups, which are not profitable. Describe relevant legislative and regulatory mechanisms. (GRI, 2003); (BT, 2004); (Telefonica, 2003) • PA1: Policies and practices to enable the deployment of telecommunications infrastructure and access to telecommunications products and services in remote and low population density areas. (GRI, 2003); (BT, 2004); (Telefonica, 2003); (Vodafone 2003/04, partly) • PA4: Quantify the level of availability of telecommunications products and services in areas where the organisation operates. (GRI, 2003); (BT, 2004); (Telefonica, 2003) • PA6: Programmes to provide and maintain telecommunication products and services in emergency situations and for disaster relief. (GRI, 2003); (BT, 2004); (Telefonica, 2003); (Vodafone 2003/04) • Percentage of households and businesses having broadband service available (BT 2004)

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
T8.2 Traditionally excluded societal groups Standard ICT equipment can be inappropriate for certain groups in society. These are often marked by language, culture, illiteracy, lacking education, income, disabilities, and age. ICT should be try to reach a number of groups as wide as possible. Combine low and high technology to achieve relative ubiquity of access to effective and affordable information and communication technology tools. • BT (2004) • GIANI, (2004) • FFF (2003) • World Bank Group 2004	• Internet access costs (European Commission, 2002) • Percentage of central government sites that conform to the WAI accessibility guidelines at A level. (European Commission, 2002) • Percentage of social relevant sites that conform to the WAI accessibility guidelines at A level. (European Commission, 2002) • Number and percentage of households with service coverage among the poorest (World Bank Group 2004) • A-1 Fixed telephone lines per 100 inhabitants (WSIS 2005) • A-2 Mobile cellular subscribers per 100 inhabitants (WSIS 2005) • A-3 Computers per 100 inhabitants (WSIS 2005) • A-4 Internet subscribers per 100 inhabitants (WSIS 2005) • A-5 Broadband Internet subscribers per 100 inhabitants (WSIS 2005) • A-6 International Internet bandwidth per inhabitant (WSIS 2005) • A-7 Percentage of population covered by mobile cellular telephony (WSIS 2005) • A-8 Internet access tariffs (20 hours per month), in US$, and as a percentage of per capita income (WSIS 2005) • A-9 Mobile cellular tariffs (100 minutes of	• IO2: Net costs for service providers under the Universal Service Obligation when extending service to geographic locations and low-income groups, which are not profitable. Describe relevant legislative and regulatory mechanisms. (GRI, 2003); (BT, 2004); (Telefonica, 2003) • PA2: Policies and practices to overcome barriers for access and use of telecommunication products and services including: language, culture, illiteracy, and lack of education, income, disabilities, and age. Include an explanation of business models applied. (GRI, 2003); (BT, 2004); (Telefonica, 2003); (Vodafone 2003/04) • PA5: Number and types of telecommunication products and services provided to and used by low and no income sectors of the population. Provide definitions selected. (GRI, 2003); (BT, 2004); (Telefonica, 2003) • PA10: Initiatives to ensure clarity of charges and tariffs. (GRI, 2003); (BT, 2004); (Telefonica, 2003) • Waiting list for mainlines (Number of people on the waiting list and/or average waiting period) (World Bank Group 2004) • HH-1 Proportion of households with a radio (WSIS 2005)

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
	per month), in US$, and as a percentage of per capita income (WSIS 2005) • A-10 Percentage of localities with public Internet access centres (PIACs) by number of inhabitants (rural/urban) (WSIS 2005) • A-11 Radio sets per 100 inhabitants (WSIS 2005) • A-12 Television sets per 100 inhabitants (WSIS 2005) • OECD Internet access price baskets (NECTEC/NSTDA 2002)	• HH-2 Proportion of households with a TV (WSIS 2005) • HH-3 Proportion of households with a fixed line telephone (WSIS 2005) • HH-4 Proportion of households with a mobile cellular telephone (WSIS 2005) • HH-5 Proportion of households with a computer (WSIS 2005) • HH-6 Proportion of individuals that used a computer (from any location) in the last 12 months (WSIS 2005) • HH-7 Proportion of households with Internet access at home (WSIS 2005) • HH-8 Proportion of individuals that used the Internet (from any location) in the last 12 months (WSIS 2005) • HH-9 Location of individual use of the Internet from all locations in the last 12 months (WSIS 2005) • HH-10 Internet activities undertaken by individuals in the last 12 months (WSIS 2005) • HH-11 Proportion of individuals with use of a mobile telephone (WSIS 2005) • HH-12 Proportion of households with access to the Internet by type of access from home (WSIS 2005) • HH-13 Frequency of individual

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
		months (from any location) (WSIS 2005)
T8.3 Preconditions for absorption of ICT Organisational change is needed to accompany the use of ICT. High technology is not the essential element to success, but co-operation and communication are required to materialise enhanced productivity. A culture of innovation and change is needed in order to support the creative destruction made possible by ICTs. Thus appropriate institutions and accompanying investment in skills, reorganisation of companies and administrations is needed alongside the investment in ICTs. • ECOTEC (2004) • Adeya, CN. (2002) • Mansell and Wehn 1998 • European Parliament (2001)	• Graduates in Computer Science and Math plus all levels of Engineering per 1000 inhabitants (Mansell and Wehn 1998) • Percentage of population that is literate (Mansell and Wehn 1998) • Telephone mainlines (per 1000 people) (UNDP 2004) • Cellular subscribers (per 1000 people) (UNDP 2004) • Internet users (per 1000 people) (UNDP 2004) • Patents granted to residents (per million people) (UNDP 2004) • ICT Patents granted to residents (according to International Patent Classification (IPC): computing, calculating and counting (G06);	• Amount invested in ICT-related R&D and training (World Bank Group 2004) • Number of IT specialists trained annually (World Bank Group 2004) • Percentage of successful calls (World Bank Group 2004) • Percentage of households reporting satisfaction with ICT services (World Bank Group 2004) • PA2: Policies and practices to overcome barriers for access and use of telecommunication products and services including: language, culture, illiteracy, and lack of education, income, disabilities, and age. Include an explanation of business models applied. (GRI 2003); (BT 2004); (Telefonica

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
	information storage (G11); and electric communication technique (H04)) (NECTEC/NSTDA 2002) • Receipts of royalties and license fees (US$ per person) (UNDP 2004) • Research and development (R&D) expenditures as percentage of GDP (UNDP 2004) • Researchers in R&D (per million people) (UNDP 2004)	2003); (Vodafone 2003/04) •
T8.4 **ICT investments in poor countries** Spreading the use of ICT requires sufficient investment while the investment capacity of most poor countries is low, sometimes foreign investment is required. There also exists a time lag between investment and returns, thus investors with a longer perspective are needed. Concerning ICTs contribution to poverty alleviation, private investors will more likely to provide their products and services to rich parts of the population where poverty alleviation effects are unlikely. • OECD (2005) • ECOTEC (2004) • GIANI (2004), p. 18 • FFF (2003) • European Parliament (2001)	• Resource Flows to Developing Countries split by type (Official Development Assistance, Other Official Flows, Net Grants by NGOs, Direct Investment, International Bank Lending, Bond lending, Other Private) (OECD 2005) • Donor ICTs for Development Programmes and Expenditures (OECD 2005) • Bilateral Official Direct Aid Commitments to Economic and ICT Infrastructure, both general infrastructure and share of ICT realted transfers (OECD 2005) • Amount invested in ICT infrastructure (World Bank Group 2004) • Percentage of GDP invested in ICT infrastructure (World Bank Group 2004) • Profitability of investments in ICT infrastructure (World Bank Group 2004) • Amounts provided by use of public funds or	• EC10.Donations to community, civil society, and other groups broken down in terms of cash and in-kind donations per type of group. (GRI 2002)

(a) Opportunities and Threats/Challenges	(b) Meso- and Macro-level Indicators	(c) Micro- (Company-) indicators
	delivery (World Bank Group 2004)	
T8.5 **Virtual vice** ICT can be abused, for illegal activities like hacking, copy-right infringement and spam as well as facilitating other (international) crimes. • BT (2004)		• PA 7. Polices and practices to manage human rights issues relating to access and use of telecommunications products and services. For example: - Interaction with national and local authorities and own initiatives to restrict criminal or potentially unethical content. - Protecting vulnerable groups such as children. Explain how such policies and practices are adapted and applied in different countries. (GRI 2003)